

THE
DICTIONARY OF
ARCHITECTURE

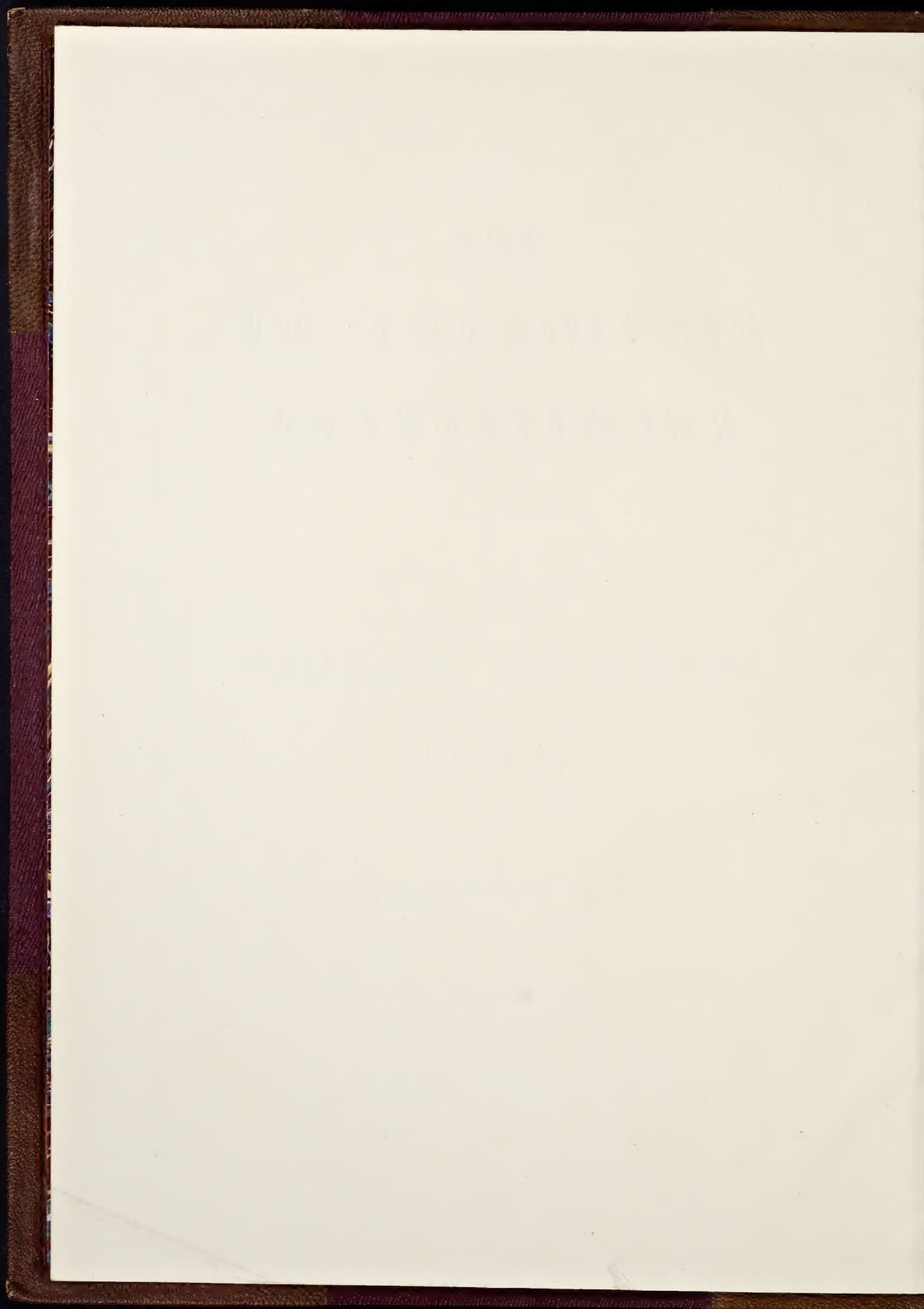
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DICTIONARY OF ARCHITECTURE.

IANS

IADARA, in Dalmatia, see ZARA.

IAGE. A term in use in the early part of the seventeenth century, apparently for a tool. The word is employed by Jupp, *History of the Carpenters' Company*, 8vo., London, 1848, in the following quotations:—"1632—These workes—belong to the joiners;—Item, all hatches iaged framed or glued", p. 296: "Item, all worke whatsoever already inuented or that hereafter shall bee inuented being made by one or two iages with the vse of all manner of nayles", p. 297: "and lastly wee think fitt that iage be indifferently vsed by the carpenters soe as they vse the same in making and perfecting such worke only as before expressed to belong vnto them and not otherwise", p. 298: and "there is almost noe carpenters worke to be done but they may and doe vse the iage and nails", p. 302.

This word is probably a misreading for gage or gauge, in which case it would mean stuff worked to a gauge or thickness. If this conjecture be correct, "iage and nayles" would be exactly the modern "labour and nails".

A. A.

IANSON (EDWARD) was born 1775 in London, where, at an early age, he was articled to an architect and surveyor practising at the west end. As soon as his term expired, he became a student at the Royal Academy of Arts, and by careful and intelligent self-culture sought to qualify himself for practice in the higher branches of his profession. For some time he was chiefly employed as a measuring surveyor, but gave up his own business to become, first the assistant and shortly after the partner, of the late D. Alexander in his town business, who was at that period engaged in one of the largest architectural and engineering practices of the day: eventually, on Alexander's retirement, he continued the practice on his own account, acting principally as surveyor to large ecclesiastical and other estates in Southwark and in the city of London. He was also much engaged in the claims and compensation cases arising out of the formation of the approaches to new London bridge, and in superintending many of the new houses in the streets leading thereto; but as the external architecture of all these structures was designed by Sir R. Smirke, who was professionally employed by the corporation of London for this purpose, there is nothing which gives any individuality to his own buildings.

Under the directions of the late commissioners of sewers for Surrey and Kent, nearly the whole of the south side of London, great part of which is below high water mark, has since the commencement of this century been drained and converted from marsh land into building land. Mr. I'Anson held the post of surveyor from the year 1804 until the commission was superseded about 1846. His colleagues in this very important work were the late Messrs. J. Gwilt and J. Newman: *Reports relat-*

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IASS

ing to the Sewage, etc., were published by them, 8vo., London, 1843. Under Mr. I'Anson's immediate superintendence, great part of Bermondsey, of Walworth, of Kennington, of the district known as S. George's-fields, Southwark, and the whole of that between the "Elephant and Castle" public house and London bridge were drained by the sewers and outlets he designed and superintended. These sewers were considered so important and successful that they became the model for other similar works in this country and on the continent.

He was also much engaged in designing warehouses, chiefly in Southwark; and in offices and houses in the city of London. During the latter part of his professional career, however, his principal business was that of a referee; a duty for which his sound judgment, quick perception, urbanity of manner, and ability as a man of business, peculiarly well qualified him. At one period of his life, professional business of this nature was very much divided between himself, George Smith, the late James White Higgins, and the late David Riddal Roper. About the year 1842 he ceased taking any further active part in the business: his first object then was to visit Rome, to satisfy his aspirations as an architect, and to fulfil the wish of his student life, which for half a century he had been obliged to postpone. He died in 1853, aged 78 years, and was buried in Norwood cemetery.

E. I.

IASSUS or IASUS. A city of Caria in Asia Minor, now known as Askem or Aseyn Kalessi. The site was formerly an island; and except where a building now called the *castrum* or *palatium*, which seems to have been rebuilt in the third century, was allowed to be placed outside the north-west portion of the defences, the extent is marked by the remains of rusticated walls from 6 to 12 ft. thick, and towers built by the Greeks in regular courses of a still dazzling white marble; in mediæval times ranges of vaults or casemates were added along portions of the walls. A map of the ruins, given in TEXIER, *Descr. de l'Asie Mineure*, fol., Paris, 1849, pl. 142, shows in addition to these remains, a Roman mole with a Byzantine tower to the harbour; a Byzantine citadel, built on the site of a temple apparently of a Doric order, of which several capitals and portions of the frieze are built into the walls; a stadium of white marble for foot-races; a building which TEXIER calls a *palaestra*; a theatre; and the fragments of two stoas; all these works are named in an order passing from south to north. The *palaestra* apparently consisted of a court lined on both sides with two ranges each of twenty-seven columns, the short ends being each occupied by three doorways to as many rectangular chambers; these are called *exhedrae* in an inscription, naming the emperor Commodus and therefore dating 180-193, on which TEXIER relies for correcting those archaeologists who had confined the use of that term to semicircular seats near

B

tombs. The wall of the stadium has rustication with bevelled arrises according to pl. 145 and 145b. The theatre, to accommodate 2,600 persons on twenty-one rows of seats, he considers to be one of the oldest in Asia Minor, and exclusively a Grecian work. It evidently had but one doorway (shown in his pl. 143) having an angular window over the lintel, the wall is divided by wide channels into rusticated blocks rounded at the edges. This doorway led to the staircase by which the visitors ascended to the platform about 31 ft. 6 ins. wide behind the upper tier of seats; this platform seems never to have had a back wall, and as the theatre equally appears never to have had a velarium, he concludes that it is older than the period of Alexander. The seats are extremely perfect, the riser having a section like those of the theatre at Taormina, in form like the outline of a lion's claw, into which each is sculptured at the ends of the steps between the cunei of the seats. Each seat is as high as two steps, and the molding at the base of the riser runs through at the base of the corresponding step. This work, shown in his plates 143-4, and in the *SOCIETY OF DILETTANTI, Antiq. of Ionia*, fol., London, 1797, ii, pl. 55, was entirely of white marble, and of moderate size, viz. 30 ft. 6 ins. in height from the floor of the orchestra to the upper platform, and about 116 ft. radius within the walls, the seats occupying rather more than a semicircle.

On the mainland was the necropolis, extending for nearly a mile on the hills. The tombs are of three sorts, viz. chambers and galleries formed by large rough schistose flags; sarcophagi and circular altars, in single blocks of white marble, alike ornamented with festoons boasted but never finished; and vaulted sepulchral chapels or tombs built of schistose small stones in mortar with single slabs of stones for doors, representing small houses. Examples are given in *TEXIER*, pl. 146-9, of skilfully planned walls about 10 ft. thick, and bastions each 35 ft. wide inside and 330 ft. apart, which he ascribes to the original inhabitants, called Leleges. These walls are on the hills whence the lassic marble was quarried, described by *PAULUS SILENTIARIUS, Sta. Sophia*, 213, as showing slanting streaks of livid white and blood-red colour.

IBANNEZ GARCIA (JOAQUIN) studied at Rome; and, on his return to Spain, erected at Benicasi in Valencia the small and simple church of S. Tomas de Villanueva. He emigrated to America, and died 28 July 1784 at Jalapa. 66.

IBANNEZ MUCIO or **IBANNEZ DE MUCIO** (MARTIN), of Garnica, was residing at Majarres when R. Ezquerria's contract made 1546 for the erection of the parish church at Arenzana de Arriba in the diocese of Burgos, was transferred to him. In the same year he contracted to erect in eight years the parish church at Sojuela, but in consequence of his death it was finished by J. Ortiz. 66.

IBARRA (PEDRO DE) was appointed 1521 to erect the body of the colegio mayor of Santiago el Zebedeo at Salamanca, with its Gothic chapel and semi-Gothic cloister, from the designs of R. Gil de Hontañon. The inscription "Petrus de Ivarra fecit" occurs in another on the high altar of the capilla de Piedra Buena in the church of the order at Alcantara; and in another are the words "se concluyo en el anno de 1550." 66.

IBARRA (DOMINGO DE) was 1563 aparejador to the cathedral at Granada under D. de Vergara. 66.

IBERO (IGNACIO DE), born 1684 at Azpeitia in the province of Guipuzcoa, was 1730 maestro mayor of the college and church at Loyola, designed for the Jesuits by C. Fontana; and 1748 undertook the completion of the church at Elgoibar in the same province, which had been commenced by L. de Longa, and continued by T. de Larraza. This work, finished 1757, entitles Ibero and his son to be considered the destroyers of good taste in the architecture of that part of Spain. He died 30 June 1766, and was buried in the parish church of his native town. J. I. de Echevarria was his pupil. 66.

His son **FRANCISCO IBERO**, born 1724 at Azpeitia, assisted

the father in the two works above mentioned. He afterwards completed 1764 the church of Sta. Maria in S. Sebastian, which had been designed and commenced 1743 by P. I. de Lizardi and M. de Salezan; and erected, from the design made 1767 by V. Rodriguez, the façade of the church of S. Sebastian at Azpeitia. He also erected the casa del ayuntamiento, two posadas, and two cloisters, at Elgoibar. He died 9 May 1795 at Azpeitia. 66.

IBIS, in Upper Egypt, see *HEB.*

IBRAHIM EL OMAIEH; see *BEN IBRAHIM*.

IBSAMBOUL, Ipsambul, and Ebsamboul, of the French writers, see *ABOOSIMBEL*, in *Egypt*.

ICE. The solid condition which is assumed by water at a temperature below 32° Fahr. It undergoes rapid contraction while its temperature descends to 38.75° or 39.2°, commonly called 40°, but, during the further loss of heat, it expands in a ratio increasing with every degree: at 32° the volume of ice is 1.075, and its density 0.93 or 0.94, as compared with water at 38.75°. The expansion of water in freezing is therefore practically taken as equivalent to a twelfth part of its bulk. But this expansion is on the surface, and spherical, so that a globular jug only two-thirds filled with water, will not burst by expansion, which, however, would break it if the water reached to the middle of the neck. Consequently a cubical or cylindrical cistern or tank will burst, when another with sides sloping to the bottom may escape injury. The specific gravity of ice is considered to be 0.94, that of water being 1.00; a cubic foot of it weighs 58.7 lbs., or there are about 38.2 cubic feet to a ton. The density of ice is 930, distilled water at 60° being taken at 1000. Its modulus of cohesion, or the length required to break its cohesion, or tear it asunder, is 300 feet; and its modulus of elasticity is 6,000,000 feet, both according to *BRVAN*. A thickness of 8 ins. of ice will bear with safety a weight of 1,115 lbs., or nearly half a ton on the square foot: *GRIFFITHS, Artillerist's Manual*, 8vo., London, 1859, p. 64. A space of six cubic feet is generally allowed for every 112 lbs. of rough ice without straw; but a solid block of ice at that size would weigh about 378 lbs.: so that, when stored to a weight of two tons per square foot on the ground, ice would be 72 ft. high even if solid; and this fact throws doubt upon the statement made in the *ILLUSTRATED LONDON NEWS Journal*, 1845, vi, 315, that each warehouse, 100 ft. square, at Wenham lake, holds 20,000 tons of ice. *BOSTON*. A domed well 13 ft. 6 in. deep from the grating to the springing, 5 ft. in diameter at the former and 13 ft. at the latter, will hold about 100 loads of ice; and, when filled, has been stated to prove sufficient for the year at an English mansion in the country. A bulk of ice 8 ft. high and 10 ft. square was found sufficient for a large family, with thirty-five cows, and making presents to neighbours during the season. The intrinsic value of ice depends upon the investigation of an assayer, according to the *CIVIL ENGINEER Journal*, 1848, xi, 352, which states that ice from Lower Canada is much colder than that from Upper Canada, which is colder than that from Wenham Lake; and that the ice from the latter is much colder than that formed in England.

ICE HOUSE. The winter habitations of the Esquimaux who visit Fort Churchill in North America, though built of snow, are very comfortable dwellings. The process of erecting a small one consists in selecting on the river a site on which is a layer of snow 24 ins. thick: then drawing a circle 12 ft. in diameter as the extent of the house, and cutting out concentric circles of the snow on the site. This snow is raised in blocks 36 ins. long, 6 ins. thick, and 24 ins. deep, having a slight curvature corresponding with that of the circle from which they were cut, and so tenacious as to preserve their arrises when laid in courses around the original circle: the beds are slightly sunk, so as to give the walls an inclination towards the interior; by which contrivance the building acquires the properties of a dome: the vault is closed suddenly and flatly by cutting the upper slabs as wedges rather than as blocks. The roof is about

8 ft. from the floor, and the final aperture is closed by a small conical piece. The work is done from the interior, and when the building is covered, a little loose snow is thrown over it so as to close every chink, a doorway is then cut and a porch built, a window cut and filled with a piece of clear ice, and a bedstead formed of slabs of snow covered with branches of pine. A larger dwelling is shown as thus arranged:—



A, steps. B, porch. C, antechamber (? for dogs). D, diashole. E, antechamber (? for implements). F, closet (? privy). G, kitchen; with K, wood-store; L, cooking-place; and M, fire-place built of stone. N, dwelling room; with O, clear space; P, bedstead; Q, sitting-place or second bedstead; R, shelf or pillar for lamp; and B, pit for bones and offal. R, small pantry. S, store-room for provisions.

But ice, as a material for building, was not held in much respect until imperial patronage had sanctioned a courtier's whim of using it (in spite of a failure at the first attempt) in the erection of a house 56 ft. long and 17 ft. 6 ins. deep, and of other objects, all given in KRAFFT, *Description exacte de la maison de glace construite au mois de Janvier 1740*, 4to., S. Petersburg, 1741. This would appear to have suggested imitations, as the *BUILDER Journal*, 1862, xx, 811, notices a proposal to build an ice-palace 144 ft. long, 56 ft. deep, and 40 ft. high, at Montreal, for about £750, in a month, by Mr. Hassel, "engaged in similar undertakings in Russia".

ICE PIT AND SAFE. The utility of ice is better appreciated by the fishmonger than by any other person; but the butcher, the poulterer, the dairyman, and other tradespeople, might well save by means of it some portion of the food often wasted on their premises for lack of purchasers: and preserve the supplies for gradual distribution. For some few years, Jolley's and other safes have been used by butchers and others in London, and to preserve in carcase the flesh and fowl provided for consumption on the Atlantic steamers. The arrangements of ice-drawers at the Reform clubhouse are considered worthy of special notice for convenience. Drainage, dryness, coolness, and exclusion of external air, for the purpose of preserving ice, may be as well secured by faggots and straw in a cellar, as by the most expensive structure constructed for the purpose. In France, large quantities of ice are preserved either in round baskets or in frames suspended in a cellar or in a pit and covered with straw. In Italy, ice or snow is placed in a grotto formed in chalk soil and approached by a circuitous descent filled with straw and covered as much as possible. The Italian pits are called "conservatories wherein snow and ice are kept all the summer" by BOYLE, *New Experiments and Observations touching Cold*, 8vo., London, 1665, p. 407, who gives a section and the following account of them by EVELYN. The snow pits in Italy, etc., "are sunk in the most solitary and coolest places, commonly at the foot of some mountain or elevated ground, which may best protect them from the meridional and occidental sun: 25 ft. wide at the orifice, and about 50 ft. in depth, is esteemed a competent proportion. And though this be excavated in a conical form, yet it is made flat at the bottom or point. The sides of the pit are so joined (joisted) that boards may be nailed upon them very closely jointed. [His Majesty's at Greenwich, newly made on the side of the castle hill, is as I remember, steened with brick, and hardly so wide at the mouth. I have seen also the sides lined with reeds longways, instead of boarding or steening.] About a yard from the bottom is fixed a strong frame or tressel, upon which lies a kind of wooden grate; the top or cover is double thatched, with reed or straw, upon a copped frame or roof, in one of the sides whereof is a narrow door-case hipped on like the top of a dormer, and thatched; and so it is complete.

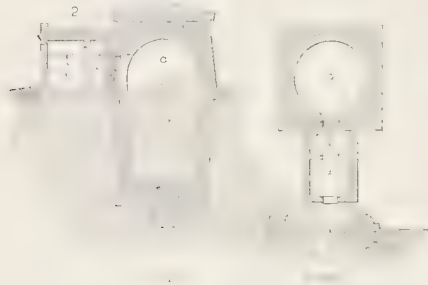
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To conserve snow they lay clean straw upon the grate or wattle, so as to keep the snow from running through, whilst they beat it to a hard cake of an icy consistence which is near one foot thick: upon this they make a layer of straw, and on that, snow beaten as before; and so continue a bed of straw, and a bed of snow, s.s.s., till the pit be full to the brim. Finally they lay straw or reed (for I remember to have seen both) a competent thickness over all, and keep the door locked. This grate is contrived that the snow melting by any accident in laying, or extraordinary season of weather, may drain away from the mass, and sink without stagnating upon it, which would accelerate the dissolution, and therefore the very bottom is but slightly steened. Those who are most circumspect and curious preserve a tall circle of shady trees about the pit, which may rather shade than drip upon it." The Add. MS., 10,116-7, in the British Museum, p. 130, notices that in October 1660 "a snow house and an ice house was made in S. James's park, as the mode is in some parts of France and Italy and other hot countries, for to cool wines and other drinks for the summer season."

It is probable that jars having drain holes might, if placed in an air-tight double cistern with two wastes, be advantageously used even above ground for the preservation of the quantity of ice required by a small family in a town. For obtaining ice water in summer, in a town house, there seems to be no difficulty apprehended by those who recommend the purchasers of foreign ice to dig a pit in a vault, and steen it with an impenetrable enclosure of brick—holding a wine-cask 6 ft. high and 3 ft. diameter (better if larger), with a 4 in. packing of ashes or cut straw. The cask has a double bottom, the upper one pierced with holes, and from the space between the bottoms a pipe to a drain. The lid, formed like a sieve, is lined below with thick woollen cloth, and holds in the upper part a layer of ashes or cut straw tightly pressed together; the lid fits so closely to the iron hoop at the top of the cask as to be perfectly air-tight. But drainage cannot always be secured in the vaults of such a residence. Pounded ice, stored on hurdles lined with straw resting on loose boards laid hollow, with a drain of common perforated piping, will keep for years if packed against a straw lining to a wall of clay about 6 ft. high and 3 ft. thick, carrying a roof of straw thatch about 18 ins. thick; according to DEAN, *Essays on the Construction of Farm Buildings*, 8vo., London, 1849; who, with regard to the use of clay, agrees with QUATREMÈRE DE QUINCY, *Dict.*, s. v. *Glacière*. One of the roughest modes that can be adopted in England is a mound, having a floor sloping to a trench with one or more drains from it: on the floor are placed faggots 24 ins. in diameter covered with 12 ins. of straw, then a mass of ice, the larger the better, covered with 12 ins. of straw, then another layer of faggots and one of 24 or 36 ins. of straw or thatch are placed successively; and over the whole a shed roof open on all sides but the south, unless the mound be protected by the shade of trees. The reverse of this operation is (in suitable soil, of course) a dry well, from 5 to 6 ft. in depth and from 18 to 24 ft. in diameter, lined with chalk or straw confined by a 4½ in. wall, covered with a stout boarded roof coated with 12 ins. of clay, and thatched. On a larger scale the well may be from 14 to 20 ft. deep and 24 ft. in diameter, having a 6 in. lining of chalk confined by brickwork, and covered by a dome one brick thick, having an eye 18 or 24 ins. in diameter, carrying a tube about 3 or 4 ft. high and having a wooden air-tight cover closed with a stone; the dome to be covered with a mound of earth either thatched or planted. A grotto or small cave, with a porch and a drain, forms a natural ice-pit. BESANÇON.

ICE WELL AND STORE. In damp soil or in clay, ice requires a construction having a floor, walls, and a roof, all double, and a passage to it 10 or 12 ft. long: the walls and floor may sometimes require to be treble: in general a kind of pit is preferable, in order to reduce the height of the building above

ground; but often, as in some of the Midland counties, the drainage will not allow of any pit. The usual shape of a pit for this purpose is that of an inverted and truncated cone, which is supposed to allow the ice to drop closer together as the diameter of its mass may happen to lessen in melting, but the advantage of any particular shape is doubtful, as in practice the ice forms a solid mass, and the waste is all on the top and sides. The pit is to be defended from the external air by two, three, or four doors in the passage, according to the frequency of the visits which will be made to it: and two of these doors should never be open at once. The following section taken



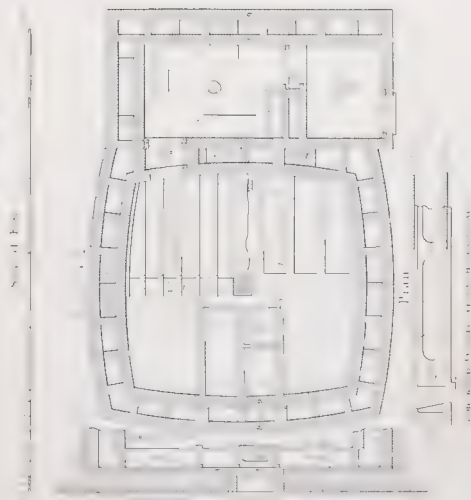
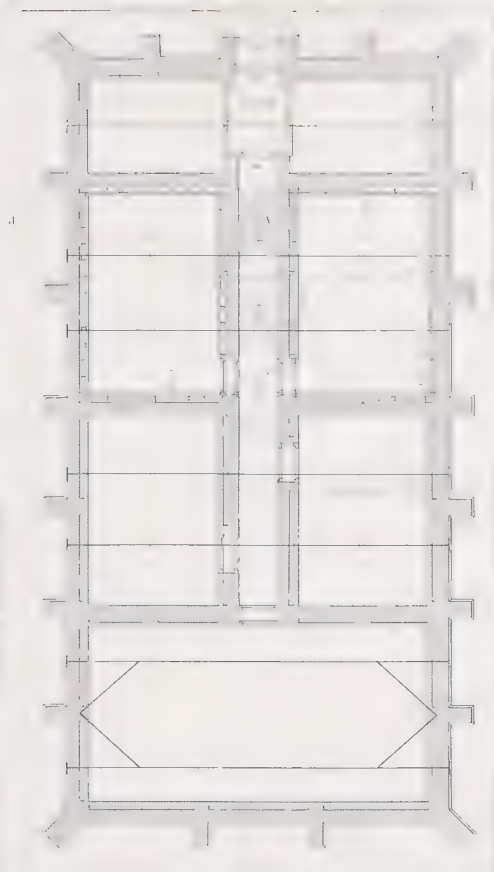
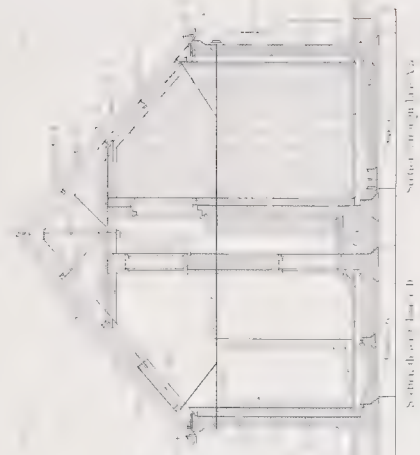
from PARWORTH, *Rural Residences*, 8vo., London, 1818, has been the standard for most works of this nature, except that an additional porch externally has been recommended. When this section is adopted upon a large scale, it is desirable to lay over the concave brick floor, another floor D, fig. 2, of battens 1 in. apart on stout joists which will rise 3 ins. above the sinkstone, and to put a fixed step ladder to the door, B, of the pit, passing through a large trap in an upper floor: this upper floor is always convenient, even if the well be not fitted with shelves or hooks. Sometimes a moveable table is made to run through the well door: in such cases the frequency of visits to the well should necessitate the third porch. A sufficient coolness for the temporary preservation of some kinds of food is obtained by making the porch, A, a larder with shelves, etc., and occasionally but regularly opening the pit door. The first porch sometimes, the third always, should be kept stuffed with the weakest (*i. e.*, barley) straw, that may be confined for the sake of neatness in rope-net bags, say five to a porch, made right-angled triangles in plan: a pair of similar bags should be placed in the door of the pit if that be made double. Sashes to the doors, with shutters perhaps, form the best mode yet suggested of lighting an ice-house. Hollow, or rather double, walls are needed to keep off the heat of the earth, which is constant at about 50° or 52°; and when the walls above the ground are not very thick in themselves as well as in combination, it is usual to place over the building a shed roof, if there are no trees to shelter the giant ivy which is strongly recommended as a cover to the whole: or else to bury the whole in a mound also to be covered with ivy or with evergreen shrubs. Some writers urge that trees overhanging an ice-house are not desirable because, by preventing circulation of air and, consequently, evaporation, they produce more injury than would arise from the heat from the sun. Thatch is considered the best roofing material for an ice-house, and it allows of a current of fresh air between it and the crown of the pit. A mere well for ice may, if covered with an *air-tight* double trap-door, be put in any unwarmed outbuilding where a drain can be provided. In every case the drain should be twice, or even thrice, trapped to prevent access of air, and one trap at least should have an iron grate, with perforated zinc, to prevent access of vermin and insects, in cases where the well is to hold food. It may be remarked that in the first year the store of ice is generally lost, the coldness of the water having been absorbed by the walls; if the store is lost in another year,

the drains should be examined, as more ice is melted by the air getting up the drain than is commonly supposed; to prevent this fault, it has been suggested that the pipes might be loosely filled with straw.

There are two ways of filling the well: one for ice to be used for confectionery, the other for rough ice. In the first case the ice is pounded as small as possible; straw is laid and then covered with it, then sprinkled from a rosed watering pot with a mixture of one pound of salt melted in a gallon of water; and then again, until a solid mass 6 ins. thick of ice is produced: for 6 ins. depth of ice in a well 24 to 28 ft. in diameter, 56 lbs. of common salt may be allowed, but not more, and none should then be elsewhere employed; MASTERS, *Ice Book*, 8vo., Lond., 1844. On this the remainder of the pounded ice is rammed in a body, and occasionally sprinkled with pure water; some persons add salted water at every two feet, ending with a double quantity of salt water at top. But even this mode ought to have a coating of reeds or else wheat, rye, or oat, straw at the sides. The other method is to pack (not pitch) in, a layer about 12 or 18 or 24 ins. thick of rough ice as closely as possible, in a nest of straw, and to repeat the operation until the well is full. The transportation of the material from the well to the table is now easily managed by proper ice-pails; but even in summer a flannel wrapper will be sufficient for block ice during a short transit.

Speaking from his American experience, CORBETT asserted that moisture was the greatest enemy that attacked a structure for this purpose; and insisted that an ice-house should be built as dry as possible, in the open sun and air, upon a site from which the melted ice would naturally fall away in every direction. He recommended a circle for the form; and posts, plates, rafters, laths, and straw, for the materials. When built and thatched, the enclosed space would be covered with short logs placed 12 ins. apart, crossed, and again crossed by poles about 6 ins. apart, with $\frac{3}{4}$ rods put an inch apart over all to carry the layer of dry twigs or strong heath forming, at 17 ins. from the ground, the bed for the ice. And the BUILDER *Journal*, 1863, xxi, 615, notices that the result of partly sinking the ice well, as adopted by HOLLY, *Country Seats*, 4to., New York, 1863, appears to justify the system recommended by CORBETT; for with a foundation 24 ins. below ground, and two hollow walls with a space between them for confined air, a layer of spent tan for the ceiling, and an inch and a half tube for a ventilator, the ice wasted in the sunken part alone. An account of the inutility of converting a live well into an ice well by putting a floor 3 ft. above the level of the water is given in that *Journal*, 1845, iii, 346, which recommends three doors before the chamber with straw packed between them. The same *Journal*, xx, 230, says that thick walls are only necessary for ice wells above ground, and then only to resist the enormous lateral pressure which is supposed to arise from small fragments of ice sliding over each other. The expansion caused by the particles of ice suddenly freezing into a solid mass is also dangerous. At the Crystal Palace, Sydenham, the walls of the ice-well are 14 ins. thick in brickwork, but two-thirds of its height are below ground, to protect it from changes of temperature and to resist the pressure.

From American sources, the DUBLIN BUILDER *Journal*, 1861, iii, 406, urges that ice wells cost more than they are worth, and that ice-houses are as good, if not better. It suggests that an ice room inside a building would be sufficiently large if 10 or 12 ft. square, with the top, sides, and floor, doubled and packed with sawdust or tan-bark: and it considers that family ice-houses, for ice purposes only, are generally made too small. It then gives a specification for a room 20 ft. long by 16 ft. wide and 8 or 10 ft. high at the plate, as not more than sufficient for the largest private family, unless ice be needed for extraordinary purposes, as butter making, etc. The wall is composed of two rows of posts, 8 ins. by 4 ins., 12 ins. apart, let 4





or 6 ins. into the ground, and spaced for the outside row 4 ft. apart with a 4 in. by 3 in. collar spiked at (not on) their tops to connect the two sides; and the same may be done for the floor, consisting of boards carrying a bed of straw altogether a few inches thick. Dependence is placed upon ordinary soils for the absorption of the waste or water, but if the site is on stiff clay a small drain will be needed, but this must be stuffed with straw. The walls are made of two thicknesses of inch boarding, slightly nailed to the posts so as to leave 10 ins. for the stuffing, which is first put in when the boarding is 3 or 4 ft. high, and continued as each board is fixed. The door will be conveniently placed at a corner, and will require the usual linings for a door opening externally and another internally. The roof to be gabled at the ends, with 4 in. by 3 in. rafters at one-third pitch, projecting 3 ft. to protect the walls from rain, even although the structure may be in a grove of trees which form an excellent screen against the fierce heat of the sun. The roof may be of shingles on boards, or of boards battened in two thicknesses over each other, the gables boarded, with spaces or louvres or holes for free circulation of air amongst a loose coating of straw placed on a boarded floor resting on the joists above named. A 6 in. ventilating tube is sometimes placed at the ridge, but two are necessary. The room thus made is to be divided by a partition to leave an entrance passage 3 or 4 ft. wide forming a larder: the partition being of studs boarded on both sides and stuffed, leaving a doorway with the door opening into the closet. If 8 ft. high such an ice-house will hold 10 cords or 30 tons of ice.

A store-house at Buffalo, New York, deserves consideration as a refrigerated larder. It is 40 ft. long by 20 ft. wide, built of stone, carrying by an iron floor supported by central columns, a deposit of ice 12 ft. in thickness on the upper story. The sides of the house are defended against heat by a non-conducting substance, which also protects the ice from above. The lower story, where fruit is deposited on the principle that cold air sinks, is kept at an almost freezing temperature, viz., 35° Fahr., and there is never a variation of more than 3°; *ARCHITECT Journal*, 1850, ii, 125.

Mr. John Turner has forwarded the following observations upon some of the ice stores in the neighbourhood of London. "In 1848, to receive block ice, I fitted up an old boiler house, 25 ft. long, 26 ft. 6 ins. wide, and 33 ft. high, the greater part of which was above the level of the ground, situated at the Ranelagh works, Pimlico. The old walls were lined with boarding fitted into grooves, framed to take their ends, and put in from the top, the space between being filled in with sawdust; no nails or iron work were exposed in the surface against which the ice was placed. This structure answered its purpose well; it is not now used for ice. The soil being gravel rendered the drainage sufficient. Since that period many other ice stores have been erected in and near the metropolis. Mr. Morgan has several of great length and width, partly above ground, situated at Barking. Mr. Gattie has built a large one, partially above ground, in the Wharf-road, Caledonian-road. It is of brick, not lined with wood; there are workshops or warehouses on each side. Perhaps the largest store that has yet been built, is the one erected by myself for Mr. T. Charles in 1859-60, situated at Lindsey-place, Chelsea. It is built of brick, 90 ft. in length, 40 ft. in width, and 40 ft. in height; having about 6 ft. only below the level of the ground. It is divided into three compartments by brick walls, and each compartment is lined with boarding and filled in with sawdust in the same way as at the boiler house above described; the ceiling is boarded and covered with sawdust; an opening is left at each end of the gable roof for ventilation. The soil being gravel afforded safe and secure drainage. In the centre of the front side of each compartment, from the level of the ground to the level of the plate of the roof, is an opening for access to the ice, so constructed that it can be opened about 5 ft. high, in stages

the whole height, at any level. The opening of each stage is closed with double boarding, the space between being filled in with sawdust; and again an outer boarding, the intervening space being filled with straw. On either side of each opening is fixed a framed iron ladder which answers the purpose of a means of ascent, and also that of eyes for the support of movable cantilevers to fix at any level to carry a platform whereon the operation of loading and unloading the compartment is performed. Over each opening is a gib with hook and wheel, blocks, falls, etc. This ice store was constructed for block ice, of which each compartment will hold about 1000 tons; but since the commencement of its use, rough ice has been filled in, and in the usual way. Subsequently to its erection, a stable and warehouse have been constructed adjoining its easternmost wall. The ice is kept in the store from season to season, with the smallest possible amount of waste that could have been anticipated. Whilst this building was in course of erection, a temporary one was constructed by me in front of it, the dimensions being 60 ft. long, 30 ft. wide, and 20 ft. high; this store was entirely of wood, being cased externally and internally with wood and the space between filled in with sawdust; it was built upon the surface of the ground, and has kept the ice remarkably well. A short description, with a view of the larger store at Chelsea, is given in the *ILLUSTRATED LONDON NEWS Journal*, 1861, p. 66."

J. T.

As the *Illustrations* on the plate are to a small scale, some explanation is necessary. Fig. 1 is a plan, and fig. 2, a section, of an ice pit, arranged for a position under a street or yard, it being covered with slate and earth supported by perforated cast iron bearers, as figs. 3 and 4; all the spaces are filled in with barley straw, which material is also placed between the doors of the chambers, where it may be packed in canvas bags for easy removal. The bottom of the pit is formed of a layer of bricks on which are built sleeper walls to carry 2½ in. stone paving; on this are placed brick on edge walls in cement to carry faggots with straw over them to receive the ice, and straw is carried up on each side to prevent the ice touching the brickwork. Besides this example, Mr. A. W. Morant, borough engineer at Norwich, has furnished illustrations of a set of drawings prepared by him for an ice store, accompanied with the following statement.

At the large fishing stations, such as Yarmouth and Lowestoft, it is now the custom to send out ice to the fishing boats, in fast sailing cutters; the fish is packed in hampers with layers of ice, and is thus better preserved than formerly. Upon this account very large storehouses are required. They are built above ground with thick brick walls strengthened with buttresses and tie-rods. To prevent the possibility of heat being transmitted to the ice there is generally an inner lining of brickwork, or one formed with studs and boarding with sawdust rammed between it and the outer wall. After the ice has been some time in store it becomes a solid mass, and all the waste then takes place at the side, so that probably there may be a foot in space between the ice and the walls. The buildings are usually divided into three, four, or more large chambers, so that one is emptied at a time, the others remaining as closely sealed as possible. They are generally filled from a passage contrived in the roof, and emptied from a passage below. One large house at Gorleston near Yarmouth, is 90 ft. long, 41 ft. 6 ins. wide, and 22 ft. high to the wall plate; it is divided into three chambers, each capable of containing 1000 tons. There is another house, consisting of one building 40 ft. long, 40 ft. wide, and 22 ft. high to the wall plate, having another chamber built against it 50 ft. long, 25 ft. wide, and 16 ft. high to the wall plate; these together will hold about 1800 tons. The principle of constructing these buildings is shown in fig. 5, a plan, and figs. 6 and 7, half-sections, for a house prepared to be built at Yarmouth, after much trouble

had been taken by the designer in inspecting the above named buildings, and in obtaining the fullest information on the subject, it also received deep consideration from a large committee of fishing boat owners, who well understood the matter: but the building was subsequently erected by other parties almost exactly on the plan here given. Fig. 6 shows the walls formed of bricks in mortar, with three tiers of three courses going through the buttresses, having hoop iron bond 1 in. by $\frac{1}{16}$ thick in three widths, all set in cement; four tiers of hoop iron were also placed in all half-brick linings, tied to the outer walls with York stone bonders 14 ins. long, $4\frac{1}{2}$ ins. wide, and $2\frac{1}{2}$ ins. thick, one being placed to every square yard of wall. Two modes are shown of adding to the walls to prevent the heat of the external air communicating itself to the interior; one by a half-brick lining, the inside face rendered in cement; the other by a lining formed of studs covered with 2 in. rebated red deal battens secured with 4 in. wrought nails. The floor is formed of joists 11 ins. by 3 ins. placed 18 ins. apart, on which are planks 11 ins. by 3 ins., placed $\frac{3}{4}$ in. apart: the ground under them is covered with a 4 in. layer of concrete with a fall to the trapped cesspool. The $1\frac{1}{4}$ in. rods have at each end twelve inches of $1\frac{3}{4}$ in. rod welded on for the screw, with a nut $1\frac{1}{2}$ in. thick and $2\frac{1}{2}$ ins. square, and plate to correspond; their ends are supported by arms from the rafters, and in the centre of the chamber is a wood stanchion to prevent them sagging, as in fig. 7. The hard red pantiles are laid on red deal splines or laths $1\frac{1}{2}$ ins. by $\frac{3}{4}$ in.; a screed of hair mortar and strong reeds are fastened to the rafters by common laths before the tile laths are fixed, to equalise the temperature. The 2 in. ploughed and tongued boarding is carried along the top of the principal rafters and collar beam to form a ceiling over the chambers and passage, and is covered with sawdust, as before stated to the walls. A. W. M.

Figs. 8 and 9 are from the ALLGEMEINE BAUZEITUNG *Journal*, 1854, xix, 330, pl. 652, being on the American system, by Bordley; the air appears to penetrate the mass of sawdust or other stuffing placed between the enclosure of the ice well and the brickwork with which the well is steened. Figs. 10 and 11 at Chateauroux, from the same work, show a double-cased safe for the ice, but this is especially described as being hermetically sealed after the French system. Two other designs accompany the text, which are similar in almost every respect to that given at the beginning of this article.

A plan and internal view of the grotto designed by Barozzi which forms the entrance to the ice-house at the villa di papa Giulio at Rome, is given in LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 469, ii, pl. 221. The ice-house or elliptical grotto by Ammanato at the end of the cortile of the palazzo Pitti has obtained much commendation; it is shewn in RUGGIERI, *Studio*, fol., Florence, 1755, iii, pl. 26-8. One of the most decorated designs for the usual ice well, is given in KRAFFT, *Plans des plus beaux Jardins*, fol., Paris, 1809, pl. 45-6, as executed in the park of the duke de Montbéliard in Alsace. An ice-house is engraved in FOULSTON, *Public Buildings*, 4to., London, 1838, pl. 23, who requires the three doors at the entrance to the chamber to be as close as possible, with straw filling the spaces between them so as to exclude the air. A design is given by NORMAND, *Paris Moderne*, 4to., Paris, 1845, iii, pl. 136-7, resembling the one on Bordley's system, but in addition it suggests the use of a stove to quicken the current of air. It is curious that among the designs that have been published there is but one in which the shape of the cone is used with the smaller end upward: this occurs in MANDAR, *Études*, fol., Paris, 1826, pl. 117.

ICHMUL, in Yucatan, see IZAMAL.

ICHOGRAPHY (Gr. *ἔχως*, the print of the foot on soft ground, and *γράφειν*, to write or describe). One of the methods of geometrical projection described by VITRUVIUS, i, 2, being the plan or horizontal section of any building taken at such a height from the respective floors as to show the outer walls,

the divisions of the rooms, the opening of the windows, doors, and chimneys, with the stairs, etc. A. A.

ICICA ALTISSIMA, the CEDAR of Guiana.

ICKHAM (THOMAS), monk and sacrist of S. Augustin's abbey, Canterbury, erected the west gatehouse of the cemetery at a cost of £466:13:4. It is noticed in a document dated 1268, given in SOMNER, *Antiq. of Canterbury*, 2nd edit., fol., London, 1703, p. 33, and was standing about 1640. 19.

ICOLMKILL, in Scotland; see IONA.

ICONOCLASM (Gr. *εἰκών*, an image, *i. e.* a picture or a sculpture, and *κλᾶσθαι*, the act of breaking). The destruction of images, recorded in the Old Testament from the days of Moses until those of Daniel. The earliest classic notice of this act is perhaps in PLINY, *H. N.*, xxxiii, 24, with regard to the demolition B.C. 36 of the statue of the goddess Anaitis. About 389 A.D. Theodosius gave a special commission to three officers, which included the seizure and destruction of the instruments of idolatry; and this involved the destruction of the idols. One of the first Christian iconoclasts was Epiphanius, 367-402. In 726 Leo III Isauricus excited the iconoclastic wars by his edict forbidding the worship of images; they lasted till 797, and ceased 842. The second council of Nicaea 787 being supposed to have attributed to images the worship due to the divinity, the council of Frankfurt 794 by its second canon rejected that decision: and ROMÉLOT, *Descr., etc., de l'église, etc., de Bourges*, 8vo., Bourges, 1824, p. 79, states that a consequent law by Charlemagne, forbidding all worship relative to images in the interior of churches, is the reason that in the ninth and tenth centuries no figures were sculptured in churches; but that in the eleventh they began to be employed. At the commencement of the twelfth century the Waldenses renewed the opposition to images; and their example was imitated by the Albigenses, and later by the followers of Wicliffe and of Calvin: the same course was pursued by the Hussites 1420 and the Zuinglians; but the Lutherans appear to have allowed crucifixes and pictures to remain uninjured. Being considered to be 'fantâmes et contre-revolutionnaires', the statues of sovereigns as well as of saints, were destroyed in the French revolution 1792-9.

ICONOGRAPHY. The representation by figures symbolical, allegorical, and historical, in scripture, in glass, in illuminated works, and in engravings. The iconoclastic troubles excited by Leo III increased under his son Constantine V Copronymus, from whose rule a large number of monks fled in 741 to Italy; many of these were painters; and the event may mark the establishment of Greek iconography in the western empire. The following valuable publications comprise the period between the early ages of Christianity down to the end of the sixteenth century. DIDRON, *Monographie Chrétienne; Histoire de Dieu*, 4to., Paris, 1843; and DIDRON, *Manuel d'Iconographie Chrétienne*, 8vo., Paris, 1845; both critically reviewed in *Annales de Philosophie Chrétienne*, xxviii, 383, and xxix, 53, 124. A translation of the part relating to the *Application of the form of the Cross during the Middle Ages*, by DONALDSON, read at the Royal Institute of British Architects, is given in the *CIVIL ENGINEER Journal*, 1815, viii, 215-7; 247-8. EMBLEM.

ICONOLOGY. The science of representation by pictures or emblems, a kindred subject to the above, will be found fully treated in RIPA, *Iconologia, ampliata dal G. Z. Costellini*, 4to., Venice, 1669; a later edition by Abate C. ORLANDI, 5 vols., 4to., Perugia, 1764; and PINNOCK, *Iconology, or emblematical figures explained*, 12mo., Lond., 1830. ATTRIBUTE; EMBLEM; SYMBOL.

ICONOSTASIS. The iconostasis or 'image bearer' is merely a kind of lofty screen, occupying the whole width of a Greek church, generally attached to the first piers or columns towards the east, and rising up to the vaulting, thus dividing the church into two separate parts. While in the Latin church the ceremony of the consecration of the host was continued to

be performed in sight of the whole community, by degrees it was thought advisable in the Greek celebration of that sacrament to conceal that act from the eyes of the laity. The altar and the sanctuary containing it were consequently closed by a screen with doors, whence, after the consecration had taken place within, the priest issued forth to impart the host to the congregation outside; this screen is called the iconostasis. Veils, formed like those represented in the building, inscribed 'palatium,' in the superb mosaic of S. Apollinare di Dentro at Ravenna, and suspended from bars between columns and piers, were much used to separate the narthex from the nave, the nave from the choir, and the choir from the sanctuary; HOPE, *Hist. of Architecture*, 3rd edit., 8vo., Lond., 1840, p. 116. It is therefore an indispensable arrangement in the Greek church, as it covers or conceals the three altars from public view.

The iconostasis has generally three doors, one on each side of a central opening, behind which is placed the altar, surmounted by a baldachin. Behind the lateral doors is placed another iconostasis occupying only the width of the smaller apse, and its arrangement is analogous to the great one. This form is met with in the ancient churches, but in the more modern ones an alteration has been made, so that at the further extremity of the edifice are seen three distinct iconostases upon the same line. In every Greek church this screen is the principal feature and attraction, standing on steps not exceeding seven in number. A perfect one is the representation of the celestial kingdom. It is composed of four or five tiers, the former number being indispensable. Each tier is composed of an unequal number of saints painted on tablets, the position of which is rigorously fixed. In the first tier, are the three doors before named, the centre one larger, made folding, and ornamented with a representation of the Annunciation of the Virgin (the Virgin being on one of the leaves and the angel on the other), accompanied by the heads or emblems of the four evangelists. On the right of the opening is placed a painting of Christ, then the saint or the festival of the church, then a small opening having only a single door, above it the cross of Moses, and beyond it other saints. On the left of the central opening is the Virgin, with a similar arrangement, and the small door having over it the Greek cross.—Of these principal pictures only the hands, heads, and feet are visible, the body being covered with a metallic clothing or drapery of silver or gold in very flat relief—the ground, like that of the whole iconostasis and often of the entire church, is gilt. Before each picture a lamp is suspended exactly in the middle; the picture being only so high as to allow kissing at least of the feet. On the second tier, Christ is represented in the middle, seated on a throne, and clad in pontifical robes: on the right, S. John the Baptist; on the left, the Virgin without the child, both followed by two archangels on each side, and six apostles: these tablets in the old churches merge one into the other without ornament, but in the more modern buildings they are divided by small gilt columns, etc. On the third tier the Virgin is placed in the middle seated on a throne, holding the infant on her knees, with paintings of the prophets in the divisions on each side. On the fourth tier God the Father is represented on a throne in the centre with the infant Jesus; on each side are the patriarchs of the church: the figures in this tier are surmounted by small arches, the centre one being larger and higher than the others, and as the figures in them are seated they are painted twice the size of all the others on the screen, which are standing. Where a fifth tier is introduced, it is placed between the first and second, or between the second and third, and on its tablets, which are only half the height of the others, are portrayed the history of the Saviour, the last supper, the passion, the crucifixion, etc. In inferior churches the iconostasis is much more simple, though in some particulars it is everywhere essentially the same. A complete one is shewn by HALLMANN, *Ecclesiastical Arch.*, etc., in *Transactions of the Royal Institute of British Architects*, 4to., 1842, p. 95. Some good views of others are

given in WALSH and ALLOM, *Constantinople, etc.*, 4to., Lond. 1844. The iconostasis in S. Giorgio Minore de' Greci, erected, in the seventeenth century, at Venice, is described in WEBB, *Ecclesiology*, 8vo., London, 1848, p. 294-5.

In some small churches, representations of the Saviour, and of the Virgin Mary (on the left side), are only introduced. In the Russo-Greek chapel, Welbeck-street, London, designed 1864-5 by J. Thomson, the screen is divided into seven compartments, the centre one being the principal entrance with bronze gates richly gilt; whilst the second and sixth, being concealed doors, have panels for paintings: these, with the other four, were sent from S. Petersburg, and represent (from the left hand of the spectator), S. George, S. Gabriel, the Virgin and Child; Christ, S. Michael, and S. Nicholas. The gates have four circular panels with heads of the Evangelists, and two centre panels representing the Salutation. A semicircular panel over the screen represents the Last Supper. The Latin church has occasionally to a degree imitated the iconostasis of the Greek; thus the altar screens at Winchester cathedral; S. Alban's abbey; S. Saviour's, Southwark, with slight modifications, are a repetition of the same features and idea, with statues substituted for the Byzantine *icones* or pictures.

ICTINUS, a contemporary of Pericles, designed two, if not three, of the most celebrated of the Greek temples, namely, that of Athene or Minerva called the Parthenon, in the acropolis at ATHENS; and that of Apollo Epicurius, near Phigaleia at BASSÆ in Arcadia. The former temple was completed B.C. 438; CALLICRATES was associated with him in the work; and in conjunction with Carpio, Ictinus wrote a description of the building, as mentioned by VITRUVIUS, vii, pref. The latter edifice is thought to have been completed before B.C. 431, on the ground that it is not likely that Ictinus built it after the breaking out of the Peloponnesian war, an argument by no means conclusive. Ictinus also designed about B.C. 440 the cella of the temple to Ceres and Proserpine at ELEUSIS in which the mysteries were celebrated; to this very large building the external portico was added by Philo, B.C. 318; VITRUVIUS, vii, pref. All these buildings were of the Doric order; the first two were hypæthral, as was possibly the last. PAUSANIAS, viii, 41; STRABO, ix, pp. 395-6, 606; compared with PLUTARCH, *Pericles*, 13. He died 429 B.C. 3. 59.

ICULISMA. One of the ancient names of ANGOUËME, in France.

IDEA, see DESIGN.

IDEN, the ancient Tralles, in Asia Minor, see AIDIN.

IDIAGA (DOMINGO DE) was engaged 1622 in the construction of the church commenced by M. de Aramburu for the Franciscans at Tolosa; but, dying before it was completed, he was succeeded by N. de Zumacta. 66.

IDROGO (DON PEDRO CARO), a quartermaster-general and commander of the light horse, was *maestro mayor* and *aparejador* from 13 December 1712 until his death in 1732, of the palace at Madrid; and doubled the works of J. de Herrera at the palace of Aranjuez on the eastern side. 66.

IGEL, in Prussia, see TRÈVES.

IGLESIAS. A small town situated in the south-west portion of the island of Sardinia, and a seat of the bishopric of Sulcis. Near the town, the ruins of the Porta Nova and of the castle of Salvatierra, or Mons Regalis still exist. The cathedral, though a small building, is the most important of the many churches, and the interest attached to it is more of an historical than of an architectural nature; for although there are some details about the west front that are of the style of Arragonese Gothic, yet the bulk of the edifice is without any character whatever: there are two very curious inscriptions proving that the church and the surrounding country at one time were in the possession of count Ugolino della Gherardesca, who figures in such a terrible manner in DANTE, *Inferno*, canto 33, v. 13, etc. Numerous springs supply the

fountains in the town, but in spite of this advantage Iglesias is still as notorious for its filth and the pest of fleas as it was in the days of VALÉRY, *Voyage en Sardaigne*, etc., 8vo., Paris, 1837; AZUNI, *Histoire, etc., de la Sardaigne*, 8vo., Paris, 1802; SMYTH, *Sardinia*, 8vo., London, 1828; TYNDALE, *Island of Sardinia*, 12mo., London, 1849; FERRERO DE LA MARMORA, *Itinéraire de l'île de Sardaigne*, 2 vols., 8vo., Turin, 1860.

G. R. B.

IGNATIUS is mentioned rather as a mason than an architect, in the description of Sta. Sophia given by CODINUS; and almost in the same words by the ANONYMOUS MS. printed by BANDURI, *Imp. Orient.*, fol., Venice, 1729. He is without doubt the Aghnadus traditionally named by AVLIYA, *Narrative*, 4to., London, 1834, i, 45-55.

IGNITION. The act of kindling or setting on fire. "It is commonly imagined that the introduction of hot water, hot air, and steam pipes, as a means of heating buildings, cuts off one avenue of danger from fire. This is an error. Iron pipes, often heated up to 400°, are placed in close contact with floors and skirting boards, and supported by slight diagonal props of wood, which a much lower degree of heat will suffice to ignite. The circular wooden rim supporting a still at Apothecaries' hall, used at a temperature of only 300°, was found to have been charred to at least a quarter of an inch deep in less than six months. The late Mr. Braidwood in evidence, stated his belief that by long exposure to a heat not much exceeding that of boiling water, or 212°, timber is brought into such a condition that it will fire without the application of a light. The time it might take, he thought, was from eight to ten years. HOSKING, *Healthy Homes*, 8vo., London, 1849, states that "Day and Martin's factory in Holborn was heated by means of hot water in iron tubes. In December 1848 the wooden casing and other woodwork around the upright main pipes were found to be on fire, and from no other cause that could be discovered than the constant exposure for a long time of the wood to heat from the pipes. The pipes were stayed by cross fillets of wood which touched them, and these appeared first to have taken fire. The small pipes in the chambers were raised from the floor to about the extent of their own diameter, and the floors showed no signs of fire; but in every case where the saddle or prop had been displaced, and the pipe touched the floor, the boards were charred. It was understood that the temperature of the water never much exceeded 300°. Mercers' hall, burnt in 1853, was the victim of its hot water pipes, which had not been in work more than four or five years. The carpenters' work in the vaulted room in the British Museum, which contained some of the Nineveh marbles, was fired in a similar manner"; *QUARTERLY REVIEW*, No. cxc, 1854, p. 17.

High pressure steam has been employed to form charcoal for gunpowder; it was found that at a temperature of 200° centigrade = 392° Fahr. wood does not carbonize; that at 250° centigrade, = 482° Fahr., an imperfect charcoal alone is obtained, which was formerly called *brûlots* or burnt wood; at 300° centigrade, = 572° Fahr., the red charcoal is produced; at 350° centigrade, = 662° Fahr., and above that number of degrees, the black or complete charcoal is produced; the time required varied from three hours to three hours and a half; the wood employed was the blackthorn (*Rhamnus frangula*); *CIVIL ENGINEER JOURNAL*, 1848, xi, 320. Some useful notes on the 'ignition point of coal gas' will be found in the *BUILDER JOURNAL*, xx, 357.

"When air is compressed in a syringe, sufficient heat is evolved to ignite certain substances, such as German tinder, and in some cases the heat produced is so great as to render the air luminous"; BAKER, in the *Freemasons' Magazine*, etc., 8vo., London, 1858, v, 1114. The effects of HOT AIR on wood are detailed *s. v.*, from the paper read by LEWIS, at the Royal Institute of British Architects, 3 April 1865, wherein he also noticed the scorching effect of hot water and steam at 240°, on a piece of deal exposed for about seven months, and which

then appeared ready to take fire. At 620°, hot water in pipes ignited shavings; and it was repeatedly noticed as a curious fact, that the heat was often greater at a distance from the furnace than near to it. A factory has been set on fire the first night of using the hot water apparatus, the pipes of which had been taken through the floor. COMBUSTION.

I. H. S., see MONOGRAM.

ILACHOA (LAURENCIO DE) designed 1543 the church for the Franciscan nuns at Puebla de Montalban in New Castile. 66.

ILDEBRAND (GIOVANNI LUCA), born 1666 at Genoa, was a son of Cristoforo, a captain of the Swiss guard in that city. He was at first educated as a military engineer, but having studied at Rome, turned his attention to civil architecture. His drawings produced for him the patronage of general Preiner, by whom he was introduced at Vienna to Charles VI. This prince gave him the titles of chevalier and counsellor, remitting the 4,000 florins which were payable on the occasion. Ildebrand was much employed by prince Eugene of Savoy in the buildings called the Belvedere, two miles from Vienna, in which city he died 1730. 37.

ILE or ISLE (PASQUIER DE L'), or Delisle Mansard, see DE L'ILE (P.).

ILERDA, in Spain, the ancient name of LERIDA.

ILEX AQUIFOLIUM, the Holly. A shrub producing a very clean, fine grained, and tough wood, the whitest and most costly of those used in the manufacture of Tunbridge ware, especially for articles to be painted. It is closer in texture than any other of the English woods; it does not absorb foreign matters, for which reason it is amongst other purposes used for the lines or stringings of cabinet work, both in its white state and when dyed black; when larger white wood is required, horse chestnut wood, though much softer, takes its place. The veneers are hung up separately to dry, as resting in contact even for two or three hours would stain them. Blocks of the holly are boiled in water, and afterwards closely covered up to prevent them splitting while drying; HOLTZAPFEL, *Woods*, etc., 8vo., Lond., 1843. It was formerly used for bars of doors, handles of tools, bowls, etc. ILEX OPACA, or American holly, found in the more southern states, is also employed in cabinet work, etc. The leaf of the holly is much copied in ornamental carvings, GRIFFITH, *Architectural Botany*, 4to., Lond., 1852; and the branches of it, with its scarlet or yellow berries, render it applicable for decoration in churches (hence the name holly-tree) and dwelling-houses at Christmas time in Great Britain. The shrub is chiefly valued as a shelter in winter, and as an ornamental tree in pleasure grounds, while as a HEDGE it forms, with the thorn and the locust, one of the most lasting and effectual of fences.

ILITHIYA, in Egypt, see EILEITHIYA.

ILLAMUS, in Cilicia (the Lamus of the maps). The hitherto unknown aqueduct has been illustrated from sketches by Falkener in the *Detached Essay*, p. 3, pl. 1, figs. 2, 3, and 4.

IMAGE. The name given to the statues in mediæval buildings, particularly those of saints, angels, etc. It is generally spelt *ymage* in old authors. HORMANUS, *Vulgaria*, 4to., London, 1619, p. 242 b, writes—"I wyl haue imagis berynge vp the ende of the soyle or transumpt, in cyther syde one: Volo fieri mihi atlantes. Yf ye wyl haue them of mannys fashion: they must stoupe lyke broke backed: if of womens fashion, they must stande vp ryght. Si telamones virili effigie optas: fient incurui et gibbosi. Si cariatides: muliebri effigie fiet stantes." The recumbent figure on a tomb is now usually called an EFFIGY. ICONOGRAPHY; STATUE. A designer or carver of images appears to have been called IMAGINATOR; while a carver of ornament was called INTALER.

BRITTON, *Arch. Antiq.*, 4to., London, 1814, p. 13-14, gives the contracts for executing the works at the Beauchamp chapel, Warwick, 14 March (1451-2), 30 Henry VI, which consisted of fourteen "images of lords and ladies called weepers," and eighteen "lesse images of angels," all "of the finest latten to

be gilded." *SALTEREN, Treatise against Images and Pictures in Churches*, 4to., London, 1611.

IMAGERY. An old term applied to painted or carved work, etc.

IMAGINATOR. A term used in the rolls of expenses in erecting the crosses to the memory of queen Eleanor, cir. 1300, to designate the carver of the images, or the sculptor as he is now called. Thus the following names occur, "Item, Alexandro le imagineur"; "Item, magistro Alexandro imaginatori"; and magistro Willielmo de Hibernia imaginatori", oftentimes 'cementario'. "Thomæ de Hoghtone ingeniario", is perhaps another designation; *ROXBURGH CLUB, Manners*, etc., 4to., London, 1841, pp. 114, 120-9. *WALPOLE, Anecdotes*, etc., 4to., London, 1762, i, p. 92, uses the term "Holbein's designs—; a dagger—probably imagined by Holbein." **INTAILER.**

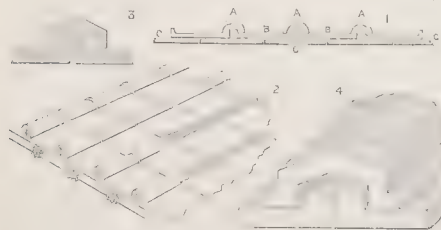
IMARET. The Turkish name for a soup-kitchen for the poor, according to *AVLIYA, Travels in the Seventeenth Century*, 4to., London, 1834, i, 174; ii, 80; iii, 9, who says, that in Constantinople at the new palace food is distributed to the poor three times a day; at the imaret of sultan Bayazid and twelve others twice a day; besides these there are some hundreds of kitchens attached to the various monasteries; but the above are the old establishments of the sultans and princes, where the poor receive a loaf of bread and a dish of soup every day: in Scutari are eleven dining establishments, of which one is a most splendid foundation, as all passengers can for three days receive twice a day a brass plate, a dish of barley-soup and bread, every night a candle, and for each horse provender: and in Broussa are four similar dining establishments for the poor. *TEXIER, Armenie*, fol., Paris, 1842, i, 145, pl. 5, gives the imaret of Oulou-Djami at Erzeroum, known as the Tchifte-Minareh, or the two minarets. It is cruciform in plan, with a triforium range over an arcade in front of chambers; and an open central court and mausoleum at the end. He says the chambers form an hospital for the poor and sick. For other medressehs or imarets, his *Asie Mineure*, fol., Paris, 1839-49, i, pl. 17; ii, pl. 86-8, should be consulted.

IMBOSSMENT or **IMBOSS** or **EMBOSS** WORK. An old term either for an alto-rilievo or 'basso-rilievo', where the figures stand out from the plane on which they are made.

ANAGLYPHIC.

IMDOW. An old term for an arch or vault; and **IMBOWMENT**, for the arching over, or vaulting, of a space.

IMBEX. A word, the etymology of which is unknown, signifying the semicircular tile *A*, fig. 1, which covers the joints of the tegula *B*, in the Roman and modern Italian buildings. *HESYCHIUS* calls it σπληνός. In the best work in Italy, the rafters are first covered with plain tiles (*mattoni*) *C*, carefully jointed so that should any rain get in under the upper covering it will run off from the lower work. Sometimes the imbrices are made tapering, that one might the more easily lap



over the other; fig. 2 is an example of a Pompeian roof showing the whole system. The ends of the imbrices were generally ornamented with antifixa. In the best Greek temples both tegulae and imbrices were worked out of the solid marble, like fig. 3, from Bassæ as given in *CANINA*. Fig. 4, in terracotta painted, is from Metapontum.

A. A.

Sometimes the end of the imbrex was a mere check or stop, decorated with a palmette or other ornament as in fig. 2: but

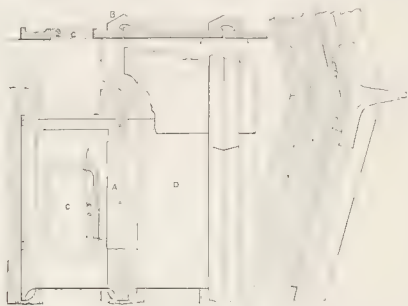
ARCH. PUB. SOC.

in several cases the end resembles the upper part and head of a *stèle*, and is decorated by painting or sculpture. The technical name for this stop appears from *PLINY, H. N.*, xxxv, 43, to be *persona*, but it is usually very improperly called an *antefixum* or *antifixa*. Sometimes the imbrices all finish at the eave, and there each ended with a *persona*, as in the cases of the temples at Ægina and Phigaleia, of the temple to Themis at Rhamnus, and of the Outer Propylæa at Eleusis. In other cases the *alternate* imbrices stopped short of the gutter and then finished with a *persona*, as at the temple to Diana Propylæa at Eleusis; or without any *persona*, as at the temple to Nemesis at Rhamnus. These dispositions of the imbrex, tegula, *persona*, and ridge-tile are given by the *SOCIETY OF DILETTANTI, Unedited Antiquities of Attica*, fol., London, 1833. The flat tile is represented to be thickest at the lower end in both the temples at Rhamnus.

With regard to the application of such a method to magnificent structures in ancient times, *COCKERELL, The Temples of Jupiter Panhellenius*, etc., fol., London, 1860, p. 28, speaking of himself and his coadjutors, observes that "this most artificial and elegant mode of the covering of temples had already been discovered by us at the Parthenon, and the temples at Rhamnus and Eleusis, during the year 1811. It was justly admired as unknown till then, and pointed out to the commission of the Dilettanti Society, on their visit to Athens in 1812, and reported by them to Mr. WILKINS", who published it in the *Profusiones*, 4to., London, 1837, pp. 15, 16, 21-6, pl. v-vii; and p. 10, translated *imbrex* as *gutter*. *PAUSANIAS*, v, 10, thought it worth while to record the period of Byzes of Naxos (cir. 590 B.C.) as the inventor of *marble tiles*; and *COCKERELL*, p. 29, calls attention to the improvement made by Athenian architects, viz. the manufacture of the joint-tiles in the same piece with the larger one, by which one side was rendered impervious to wet. This was not the case at Ægina (cir. 470 B.C.), nor at the Parthenon at Athens (488 B.C.), but was found at Bassæ (cir. 431 B.C.); although in the two latter buildings the tiles were of marble. On the same page, he mentions that at Ægina "the eaves-tiles with the joint-tiles or *ἀρροί* attached to the *antifixa*, together with those surmounting the pediment, and forming the *cymatium* or *ἐπιθήκας*, were of Parian marble; those within this border were in a fine tile of light yellow earth, together with the saddle or ridge tile, and the painted *antifixa* corresponding with those of the eaves, and surmounting the roof." He describes the tiles of the Parthenon as 2 ft. 3 ins. square; whilst those of the temple at Phigaleia near Bassæ were 3 ft. 6½ ins. long and 1½ ins. thick, by 2 ft. 1½ ins. wide, the eaves-tiles being 4 ft. 2 ins. long. The tiling at this temple to Apollo Epicurius at Phigaleia he deems, p. 53, to be "worthy of particular notice, as the most complete description of the temple roof hitherto known to us. Seventeen rows of marble tiles, the largest hitherto found, cover the roof: the five central ones (possibly a smaller number), formed the compluvium or hypæthral opening to the cella; the extreme tile, with its corner shaped to its position, was happily discovered; quite decisive of this interesting fact, but not determining whether the width of the opening consisted of five or three of these tiles." It is to be regretted that the word *compluvium* should have been used in this passage.

But the great authority just cited appears to be in error when employing the term *harmos* instead of *imbrex*, as well as when considering that the hitherto unique portion of a marble tile which in the explorations was brought to light, was the corner of a notch in the roof. In his illustration of its face, pl. vii, the tile is placed with its tail uppermost; and so far suits that theory as shown in his pl. v; but the moment that it is put in the true position determined by his careful drawing of the end of the imbrex, the fragment, which is marked in the accompanying illustration, is evidently the upper portion of the right side of a tile corresponding in size with the common tile *D*, but has a perforation or opening marked *C*, surrounded by a

chamfered fillet rising above the general face. The return of the lower part of the tile is suggested by the following facts ;



that, when such tiles were in place, the upper and lower border of the tile would appear to be equal in width; and that the fractures have occurred exactly where they might be expected if the restoration here drawn has truly represented a perfect tile. The raised fillet infers a movable rimmed cover, made either of wood or of marble. It must be observed that, in the present sketch, the plan of the tiling is not intended to exhibit the ridge shown in the section at the side; and that some details are given which would only exist where the imbrex was formed separately from the tile, as probably was the case in some instances. COCKRELL's statement that seventeen tiles covered the two slopes is confirmed by the sizes above given of the eaves-tile and plain-tile; when these facts are combined with the section of the temple determined by his dimensions, it appears impossible that more than three courses of these tiles could have been used on each side of the ridge; and the highest of these would have come next to the ridge-tile. If the border to each open tile did return, as above stated, it seems needless to discuss at great length the practical difficulties that would be involved by considering the fragment as the upper portion of the right side either of a wide opening, or of two or more slits, which must have been either 5 ft. or 8 ft. 6 ins. long in the tiling: in either case the rafters to the ridge could not well be omitted, and the work could not be executed so truly as with separate open tiles.

This important specimen of the manner in which the Greeks, at the best period of their art, solved the difficulty of covering a temple while obeying the priestly maxim that part of it must be 'sub divo', does not appear to have attracted attention until the investigation of the subject, of the admission of light and air to such edifices given *s.v.* HYPÆTHRUM was being revised. It is not intended to enter here into any consideration of the number of such perforated tiles in each course; the quantity required by the temple of Apollo at Phigaleia, would depend upon various points, viz. whether the naos was ceiled or hypæthral; and whether the statue was in the cella behind the Corinthian column: also, if the latter were the case, whether the open tiles were used on both slopes of the roof, or on one slope; and in the latter event, whether they were put on one side over the statue, or on the opposite side, it being assumed that the statue faced the side or eastern doorway. The remarkable coincidence of the method of lighting thus discovered with that indicated in the sketch given *s.v.* HYPÆTHRUM, fig. c, may possibly receive further consideration tending to a fresh investigation of the manner in which the roofs and ceilings of hypæthral temples were designed: because the opinions, of which that article is a summary, testify the interest taken in the subject by archaeologists. The novelty of this view of one mode of forming the hypæthrum will be evident to those who can see, in the admission of the existence of such tiles, a proof of the intention of the little attic shown in the sketches A and B in that article; a refutation of the dictum,

that no temples were hypæthral unless they were decastyle with double peristyles, expressed by WILKINS, *Prolesiones*, p. 96; and also a reply to great part of the usual arguments about the admission of light and weather into the ancient hypæthral temples.

Some architects may be inclined to think that, under the peculiar method of lighting here introduced to notice, there could not be at Phigaleia any such great space as is assumed to have existed between the tiles and the ceiling of the Heraeum at Olympia: because the omission of the soffits of the corresponding coffers of a ceiling fixed far below the open tiles, would hardly be sufficient to indicate the presence of this apology for a hypæthral opening; while, unless there were such rimmed covers as above suggested, the open tiles would admit water enough to flood the back of the ceiling during heavy rains. The importance of the subject will not be lessened by the fact that it may involve the questions of construction and decoration under the tiles. If it should be held that the underside of the tiles did form the ceiling, and if the carriage of the tiles upon timber rafters should be thought an objection on account of the incongruity of wood and stone in a splendid interior, it will be desirable to remember, that there were solid marble beams 18 ft. clear in the propylæa at Athens; and that marble rafters to the temple at Phigaleia would only have 11 ft. clear bearing, whereas there were hollowed marble beams 13 ft. in the clear in the north portico of that structure. J. W. P.

IMBRICATED TRACERY. A pattern formed like the tiles on a roof.

IMBRICATION. The term used in England and in France to designate the use of small stones or bricks in such a way as to form geometrical patterns, crosses, saltires, chequers, and even the figures forming dates, laid flush with the face of the work in which they occur. The effect was obtained during the eleventh and succeeding century, and sometimes in the thirteenth, by stones that differed in colour. Six examples are given in VIOLETTÉ LE DUC, *Dict.*, s. v. *appareil*, p. 31, who attributes an eastern origin to this class of work; although it is so natural as not even to need reference to the mixture of stones and herring-boned tiles seen around Beauvais. At a later period, indeed, the whole solid face of the wall was a mere CHEQUER of squares of stone alternating with squares of tiles, the latter sometimes being disposed so as to exhibit various simple combinations: squares of stone, flint, and brick have been employed: and the tower of the church at Steyning, Sussex, is chequered with squares of stone and flint.

But in the fifteenth and sixteenth centuries the required result was usually produced, as at present, by the employment of different coloured bricks, which sometimes (chiefly when black) have one or more glazed faces: the use of painted, instead of glazed, bricks has been observed in some work recently completed by London builders. Several houses with flush imbrication, at Rugles, L'Aigle, Orbec, and Verneuil, are noticed by DE LA QUÉRIÈRE, *Essai sur les girouettes*, etc., 8vo., Paris, 1846, who so distinctly confines the use of the term to the work above described, as to avoid giving it either to patterns formed by difference of colour in the slates of roofs, or to the ornamental slating, which will presently be noticed. The mixture of stone and terra-cotta, which is not unfrequent in Italy, and the recessed grounds of brickwork filled with plaster which are seen in North Germany, would be repudiated by him, as imbrication, as well as the sunk diapers of Westminster abbey.

The projecting or raised imbrications next claim attention. This class, to which no French name appears to have been assigned, consists of two sorts—the first should include real work in shingles, slates, and tiles; because the second is the imitation, in masonry, of them. Some illustrations of shingles are given in VIOLETTÉ LE DUC, *Dict.*, s. v. *bardeau*; but DE LA QUÉRIÈRE has devoted pages 61-69 to examples of the use of slate as decorations of upright surfaces. He notices that like

shingles, slates were used to cover large upright surfaces; but that the former were chiefly applied on the timber framing so as to form a border to the plastering: slates were also employed to the same restricted extent. Twenty houses chiefly erected in the fifteenth century in the city of Rouen have supplied him with fourteen subjects of slating, serving as decoration, and in many cases fixed upon brickwork; to which he has added notices of similar ornament at Lisieux, Falaise, Caudobec, Verneuil, and Troyes: in the two towns first named he specifies cases of fronts entirely covered with shingles. His sketches exhibit courses of cusps, indents, leaves, scales, scallops, trefoils, etc., either plain or perforated, forming large rectangles, lozenges, or triangles; plain or perforated vignettes or pendants; pentalphas, escutcheons, and cusplings.

To the second class belong the similar patterns, in slight relief, on the stone-work forming the slopes of buttresses, gutters, pinnacles, spires, etc., in the northern parts of France, where this system has even taken, in upright faces as in the backs of blank arcades, the place which would in England be occupied by diapers. It is supposed by VIOLETTÉ LE DUC, *Dict.*, s. v. *caillie*, that certain bas-reliefs of the eleventh century exhibit this imitation rather than the original, and in the article cited, with *architecture religieuse*, p. 218, he gives seven specimens of such raised imbrications. He notices that at first each row of such work occupied a whole course of masonry, and that the projection of the pattern from the ground was uniform; that in the thirteenth century the lower part of the scale or other pattern was made more prominent than the upper part, in cases where the work was placed far from the eye; that in the fourteenth century the work was no longer dependent upon the height of the course of masonry, and was a gross imitation of shingles, tiles, or slates with ornamental ends; that this sort of work tended to the preservation of the face to which it was applied; and finally, s. v. *clocher*, pp. 305-6, extends that merit to an example which, having the cut end upwards and a perfectly vertical face, might very fairly be considered a type of a third class of raised imbrication.

IMBRICATUM OPUS. VITRUVIUS, ii, 8, states "uncertain stones bedded one on the other, and bonded (imbricata) one to the other, make work that is not so good looking as reticulated but firmer." This no doubt was like the random coursed work at present in use, wherein the stones have various lengths and thicknesses, but are nevertheless coursed and bonded. A. A.

IMITATION. It has been frequently assumed that each art of design is an imitative art; that it reproduces in another material, and with certain modifications peculiar to that class of art, some model, whether general or individual, to be found in nature. The sculptor, as Phidias or Praxiteles, selecting the most perfect part to be discovered in the fairest forms of Greek beauty produces his Venus; or from the most perfect men, a Hercules or Apollo. The painter, as Apelles, can but reproduce on the canvas the noblest features, the most touching expression, that the human countenance can present. The poet with his impassioned language, his flowing cadences and his knowledge of human nature, can only affect us, as his descriptions recal to our minds some objects or some feelings with which we are already familiar. The very power of music exists only by the unexpected and harmonious combinations of tones already existing. All these are founded upon imitation; that imitation, be it understood, not being a vulgar commonplace repetition of any model, but a refined and new adaptation and combination of somewhat in nature. Here is an imitation more or less direct.

But how does this apply to architecture? Where does she find her models? It may be answered, perhaps, that in the tree she has had her first type of a column, etc., in a cavern that of a temple, and further than this one cannot go. But to whose mind will be represented the image of any tree, as he looks on the Doric column with its short proportions, its

flutings and its capital? And who, standing in the Parthenon, with its columned peristyle, its splendour of decoration, its variety of light and shade, would recal the gloomy caverns of Antiparos, of Parnassus, or of the Tor in Derbyshire? Directly architecture seeks to be symbolical or closely to imitate nature, it descends from its high position, disappoints and disgusts. A material and positive imitation of nature is not within the scope of this art. It is by distinct elements of taste, and peculiar adaptation of physical means, that it can, as it were by a fiction, transpose into its own productions, sentiments, and impressions, corresponding with those of the material and moral world; the true imitation of architecture then is an abstract imitation. It mounts up to the original, and seeks by the like causes and the like laws to produce the like effects. But although the exact model of the production of the architect does not exist in nature, still he is no less indebted to her inspiration. Nature may not have produced it, but she must have suggested it; and happy is he, who seeks in the wide sphere of creation, sources of invention and new ideas for the production of his taste and skill, and thus it is that the "architect imitates nature".

T. L. D.

Imitation in architecture is the acceptance, in designing, of some architect, or of some particular class of buildings, as a model. It may be tolerated, as it is in poetry and painting, so long as the style and spirit of the original are preserved. Thus Virgil imitated Homer; and Andrea del Sarto imitated Raffaele. Imitation is designing in the spirit, copyism is following the lines, of the original. The imitator, however, should have natural and original genius of his own, although he may be obliged to submit to certain conventional rules. He must endeavour to do what the original author would have done had he been in his place; he must be his disciple and not his mimic; still less must he pilfer, and especially should not claim the praise due to his model. It must be left to every one's own good sense to determine how far he may venture to imitate and to follow another, as various circumstances control the artist in various ways. It must not, however, be forgotten that straining after originality frequently leads to eccentricity, and, still worse, to deformity, as too often illustrated in the works of the modern Gothic and Italian schools.

A. A.

In proportion to the mental labour bestowed upon it, architecture becomes either a fine art or a mechanical trade. In the hands of one man it puts forward the highest claims, it addresses itself to the noblest faculties; while in those of another it is reduced to a mere question of decoration, while the architect fills the humble office of an elegant trifler. The imitation above defined does not mean a servile copy, but the expression of the idea of an original. INVENTION.

H. B. G.

The indiscriminate application of the word *imitation*, whenever a building resembles in any respect another structure, should be reprehended. Little is generally known, or at least little notice is taken, of the movements in the mediæval ages of the architects, who were then employed in places quite as widely apart as those in which some of the artists of the seventeenth century and of the present day have displayed their talents. It is therefore possible that the presumed model, as well as the buildings which are called imitations, was produced by the same man or by his pupils. Quite as erroneous is the application of the word *imitation* in any case in which the subject is either an absolute reproduction, even as regards size, or a copy upon a different scale. The Colosseum in the Regent's Park at London, may be fairly termed an *imitation* of the Pantheon at Rome; but the cast of the Choragic monument at Athens, which is visible at Sydenham, is a reproduction in plaster; while the villa at Chiswick is a mere copy of the villa Capri by Palladio, near Vicenza. IN ANTIS. Another species of imitation is noticed by those writers who see in Gothic art in the south of Europe two conditions of the employment of the pointed arch; first, the true Gothic of England, France, Belgium, Germany, with any buildings belonging

to that school in Italy, where it is an exotic, and similar works in Spain, Portugal and Sicily; and secondly, the imitation Gothic, as it is called by WILLIS, *Remarks*, etc., 8vo., Cambridge, 1835, pp. 9, 10, in Italy; to which must be added some of the works in Spain and Portugal, inclusive of the abbey at Batalha, others in the south of France, and nearly all the works executed by modern architects in the revival of Gothic architecture.

This subject may be closed with the remark that the term *imitation* is also erroneously employed with reference to such mediæval works as painted groining or tracery, as for instance in the cathedral and chapel of the castle at Chambéry, and the still more noticeable instance of Milan cathedral, which properly belong, like later works at Genoa and elsewhere, to FICTITIOUS ARCHITECTURE. Among the attempts at direct imitations of works during the mediæval period, are those mentioned in the few contracts which remain; but previous to reciting them, instances of the few round churches in England, and those at Entraigues, Neuvy S. Sepulchre, Quimperlé, and Rieux-Minervo in France, are presumed to have been meant to represent the church of the sepulchre at Jerusalem. The peculiar design of the chevet forming the east end of S. Peter's church, Westminster, should be noticed. Mr. G. G. Scott accounts for it by the sojourn in France of king Henry III, the rebuilder of the church, who may have selected it from the cathedrals of Amiens, Beauvais, Reims, and elsewhere, then being erected. This work is the only introduction into England of the perfect arrangement of chapels at the eastern end. An interesting notice exists, that in 1414 Pedro Balaguer was paid for going to Lerida, Narbonne, and elsewhere, to examine their steeples with a view to his own design for the tower of Valencia cathedral.

The earliest of the contracts states that for the construction of the stalls at Mettingham college, Suffolk, 1413-4, it was thought expedient to despatch one of the chaplains accompanied by the principal carpenter, to visit Lynn and Castle Acre in quest of a good model. In the contract for building the bridge at Catterick in Yorkshire, 1421-2, reference was made to that at Barnard Castle. The general design of Walberswick steeple, Suffolk, 1426, was to be after that at Dunstale; the west door and window over it as those at Halesworth, but the latter to be wider. The "chayrs and seges and iijj renges" for Bodmin church, Cornwall, 1491, were to be made like those in S. Mary's church at Plympton; the pulpit like that at Morton in Hemstede, or better. Horham Hall, near Thaxted in Essex, served as a model in some respects for Little Saxham Hall, 1505-6, and one of the windows was done after that of one (probably) at Stapleford Tany by two masons engaged on Henry VII's chapel. The tops of the buttresses at Burnley church, Lancashire, were to be made according to the fashion of those on the new chapel of our Lady of Whalley, and battled after the form of that to the same chapel. The cross for Coventry, Warwickshire, 1512-3, was to be made after the manner, form, fashion, and due proportion in all points, of that at Abingdon, but with four steps instead of eight; Abingdon cross had eight sides changing to six, the new cross was to have six with six over it. The stalls at Melrose abbey, 1441, were to be after the fashion of those at Dunes in Flanders, and carved in accordance with those in the choir of Thosan near Bruges. The roof of Witton church, Norfolk, was to be taken down in 1505, and a new roof made after the pattern at Little Plumstead. The glass of King's College chapel, Cambridge, was to be like that of Henry VII's chapel at Westminster; and the stalls and roodloft of Eton college chapel, were to be like those of S. Stephen's chapel, Westminster.

IMOLA (NICCOLA DA), see BOLOGNA (FRA B. DA).

IMOLA. A city on an island in the river Santerno, situate about twenty-five miles from Ravenna, in Italy. It is enclosed by old walls with towers and ditches, communicates

with the main land by a stone bridge finished in 1826, and is overlooked by an old castle. The cathedral, dedicated to S. Cassiano, was begun 1752 by Morelli, and consecrated 28 May, 1782. Besides the church of S. Francisco, erected about the middle of the fourteenth century by G. Lanfrani, there are ten parish churches; the chief being the Dominican church of S. Nicolo; S. Michele, formerly Augustinian; S. Giacomo, formerly the chiesa della Nunziata of the Carmelites; Sta. Agata; Sta. Maria in Regola, 1785-95; and S. Stefano, by Morelli. The other chief buildings are the episcopal palace, enlarged 1701-9 and 1752-84; the *seminario*, enlarged 1728-38 and 1785-95; a granary erected 1709-28; the palazzo municipale, begun about 1750 and enlarged 1800-20; an orphan asylum; an almshouse; an hospital by Morelli; and a theatre by Magistrelli, opened 1812, which replaces one that was burnt 1796, published by its architect MORELLI, *Pi-ante e Spaccato del nuovo teatro*, fol., Rome, 1780. The principal private edifices are the palazzi Sassatelli, Della Volpe, Ginnasi, Codronchi, Morelli, Machirelli afterwards Del Pozzo, Tozzoni, and Farsetti.

3. 14. 28. 50.

IMPACT. The laws of impact constitute that portion of the science of DYNAMICS, which treats of the effect arising from the collision against each other of two bodies, one or both of which are in motion. The theory is usually discussed upon the supposition that the two bodies in motion are spheres, and that they are free to move in any direction; but the conditions which architects have to consider with respect to this force, are so different from those which regulate the action of the motion of such bodies, that they require to be treated in quite a different manner. It is, however, to be observed that the architect must be considered to be interested in all that relates to the forces of impact affecting the motion of bodies; and therefore the conditions under which such impact takes place, require to be considered by him, at least in their general bearings.

The principles that are admitted to regulate the impact of bodies may be stated as follows: when a solid body, A, receives an impulse from another body, B, in movement, which acts upon the molecules of a part of its surface, these last are displaced in relation to those that surround them; this develops the elasticity of the bodies, which communicates the movement to the molecules that are situated near the first-named particles of matter, and so on until the whole mass, A, participates in the given impulse. This communication of movement requires a time which may be short, but which is definite; and the body, A, may suffer a permanent depression, or deformation, if the relative displacements of its molecules should happen to exceed the limits of elasticity. The body, B, will also suffer a depression, which may be either temporary if it be elastic, or permanent if it be not; for the molecules of its surface, which impinge upon A, will diminish in velocity on account of the resistance offered by the inertia of A. The molecules which come after the first, retaining all their velocity, would then press on these, and they would experience in their turn a diminution of velocity, so that the molecules of B would be gradually exposed to communicate the sum of the forces with which it was animated. The same thing may be observed to take place, when movement is communicated to a body by means of a string attached to any part of the surface; the movement will be communicated from one molecule to another in a time that may be longer or shorter according to the elasticity of the body, just as in the case of compression.

If the impulse be very great, and be communicated suddenly, it may happen that the first molecules may separate themselves from those that follow them, as the movement requires a certain time to communicate itself to the surrounding molecules, and this has not been allowed to elapse. This effect takes place equally in the case of extension and of compression; for if the movement of the body producing

motion is animated with a great velocity, the molecules first exposed to the effect, will be impressed by such a velocity, that they may detach themselves from the surrounding molecules before the latter can communicate the impulse from one to the other, which kind of action would take place as well in the case of a string pulling asunder the substance of a body, as in the case of a body producing a compression of the molecules by an external force. It is in this way that the action of soft bodies, to resist the effect of the shock of hard ones or the penetration of hard bodies by soft ones, may be explained; and it is to this law that must be referred the action of wind and of water upon the bodies exposed to their shock, the great velocity of movement with which the molecules of the air and water are animated, compensating for the facility with which they are displaced. Upon the same principle, the ricocheting of a stone or a bullet from the surface of water; the penetration of a tallow candle through the substance of a deal board when fired from a gun; the sawing of steel rails by a disk of wrought iron; and many other phenomena of mechanics, are to be explained.

The conditions which may be observed to take place when the weight usually called a monkey is employed to drive a wooden pile, may be considered to represent the ordinary conditions of the direct impact of bodies that are not elastic; the bodies being supposed to be animated with different rates of velocity. In this case they compress under the influence of the impact; they deform one another in a manner corresponding with their respective densities or hardness; and they advance in the direction modified by the resistance of the soil, with a velocity corresponding with that originally given, subject to the loss from the deficiency of elasticity in the bodies immediately concerned. The problem to be considered in this case, would be to find what velocity the united bodies would retain, and what would be their momentum tending to advance them in the earth. Now, the quantity of movement of the two bodies may be represented by the formula wv and $w'v'$, in which w and w' represent the weights of the respective bodies, and v , v' , the velocities with which they are animated, (in the case selected the velocity v' is in fact nothing, but the necessity of assigning the value of this quantity will be evident hereafter,) and the quantity of movement gained by the one body ought to be equal to that lost by the other. Calling u the common velocity after the shock, and supposing that v is greater than v' , the quantity of movement lost by the monkey, or the body striking, will be $wv - uw = (v - u)w$; and that gained by the body receiving the blow will be $(u - v')w'$. Thus $(v - u)w = (u - v')w'$, from this may be derived $u = \frac{wr + v'w'}{w + w'}$. The velocity with which the body would advance, is of course modified by the resistance of the ground; and the rate of refusal ought to be calculated, so that the velocity should be annihilated: BURNELL, *Practical Observations on Pile-driving*, in the *Transactions of the Royal Inst. Brit. Arch.* 1855. In calculating the force of impact, it is to be observed that the sum of the movement to be resisted is composed of the weight of the body moving, multiplied by the velocity with which it impinges the object that it encounters.

The force exercised by a weight falling upon a girder, is, however, accompanied by certain conditions that modify the resistance of the latter to the weight so falling. Thus, according as the direction of the falling body is more or less normal to the axis of the girder, the resistance of it will require to be modified; and this produces a difference in the disposition to be given to the metal in the girder, that must be calculated to resist the maximum effort to which it will be exposed. HODGKINSON has endeavoured to ascertain the effects that are produced by the sudden concussions and the rapidly moving weights to which railway bridges are now exposed, as they are so different in their action to the statical weights usually considered when arranging the dimensions of beams. The

inquiry was further pursued by the commissioners *On the Application of Iron to Railway Structures*, and Lieutenant Galton and Captain James, in conjunction with professor Willis, have added much to the knowledge of the modifications that are necessary to be introduced in the dimensions of beams, in order to resist these actions. The laws of impact as deduced from the experiments, may be stated in the following general terms.

Cast iron beams on being struck with heavy masses, as balls of metal of different kinds, were deflected through the same distance, whatever metals were used, provided that the weight of the masses were equal; thus proving that the structure of the striking body did not exert any influence upon the effect produced in consequence of the elasticity of the body. The effect was always that which would be produced by the mass m , multiplied by the velocity v . It was also found that the impinging masses rebounded after every stroke through the same distances, whatever was the kind of metal of which they were composed, provided the weights were equal; and that the effect of the masses of different metals striking an iron beam were entirely independent of their elasticities, and were the same as they would give if the impinging masses were inelastic. HODGKINSON likewise found that it mattered little what were the dimensions of a bar in depth or thickness, although undoubtedly the deflection arising from equal impacts was greater in beams of a lesser depth; but the effect of the disposition of the material in the beams was of less importance than the mass of them; so much so, that cast iron beams that were loaded with extra weights, which in ordinary trials, would have *pro tanto* diminished its available power, were found capable of more successfully resisting impact, even to twice as much as the simple bar, without the extra load. FAIRBAIRN tried some experiments on the relative merits of hot and cold blast irons, and ascertained that with some descriptions of hot blast iron, the power of resisting impact was much greater than with cold blast; but this is so opposed to the opinions of the best authorities on the subject, that the conclusions arrived at in this case, must be received with considerable caution. Every authority, however, is agreed that beams of wrought iron are deflected in proportion to the velocity of the striking weight; but that with cast iron beams the deflection is greater, owing no doubt to the defective elasticity of that metal. The effect of often repeated impacts was also made the subject of experiment by the above-mentioned commissioners, and it was found to increase with the number of blows, so much as to render it imperative that beams subject to them should not be loaded to more than one-sixth of their breaking weight; whilst it was found to be practical to load beams subject to a permanent weight to three times the maximum load. It was found, in fact, that the result of efforts of impact long continued were those that would be able to produce the rupture of a wrought iron beam through the rivet holes, which were capable of producing a deflection of only one-third of that which would be produced by a trial with dead weights able to injure the beam.

The effects of running loads have been examined carefully by the above-named experimentors, both mathematically and experimentally; but the conditions of each case in practice do not lend themselves easily to the mathematical investigation of the circumstances attending the motion of a carriage with six or four points of support, such as are met with in railway works. It appears that the effects of a running load were greater than those of the same load when at rest, and on the middle of the bar; and that the rate of deflection of the beam increased proportionally with the velocity with which the load was moving. Thus it was found that a velocity of ten miles an hour would produce an increased effect equal to about 1½ times of that the same load would produce if laid on at rest; and that it would produce double the effect of the same load if it moved with the velocity of thirty miles an hour. There

appear to be some conditions respecting the creation of motion in all the cases, that are explainable on the supposition that the effect of the passing load is not instantaneously felt, and that there is an interval distinctly marked between the effect of the rolling weight, considered as a statical force, and as a moving force; for the first produces its effect directly it is applied, whilst the latter increases in its power for some time afterwards. It appears, in fact, that the wave of the dynamical force is of, comparatively speaking, slow growth; and the effect of this is to cause the greatest effort owing to a running load, to be exercised on the last half of the girder in proportions varying with the rate of velocity with which the load may be moving. "The effects of the running load are cumulative; but little deflection occurs at first; but when three quarters of the length of the bar have been travelled over, the wave of force seems to have acquired its greatest power, and rapidly subsides at the other extremity; such a bending must greatly strain a bar;" WARR, *Dynamics*, etc., 8vo., London, 1851, pp. 256-7. The practical effect of these considerations, with respect to impact and running loads, is, however, that the lateral stiffness of any body submitted to their actions must be taken seriously into account. It is always safer to adopt the rules that are laid down above, in proportioning the dimensions of beams; and to make them of such metal and of such scantling as shall be able to resist six times at least the weight that would be brought upon them in a state of rest. PORTER, *Elementary Mechanics*, 8vo., London, 1846, p. 125.

The rebound of a body after impact is a part of the subject which need not be here entered upon. The force of impact with which air acts upon a surface normal to its direction is about 40 lbs. on the square foot, but this is stated to have been exceeded on some occasions (FORCE OF THE WIND); and in Holland the wind has been ascertained to blow over the flat level country with the pressure of 64 lbs. The force of impact of the sea is such as to enable it to move laterally bodies of a specific gravity of 2.25, and of a total weight of 30 tons; indeed, at Cherbourg, the sea has at times moved heavier blocks, and therefore the mass of masonry intended to resist the action of deep sea waves must exceed that weight. As for the resistance that is to be provided to enable a construction to resist the force of impact to which it may be exposed, the only remarks that seem to be at present applicable, are that those materials answer best which are of the same degree of elasticity as the body striking them; but, that even in the case of their being of precisely the same nature, the force of impact must produce a permanent disarrangement of the molecules, if it be of a nature to excite a violent reaction in the molecules of the body opposed to the action. Thus, wrought iron is calculated to resist the action of wrought iron or steel shot; granite or cast iron resists the action of cast iron shot; earthwork and brickwork would resist the force of impact of shot by simply yielding a passage to the body striking them, which would be limited to the dimensions of the shot and to the sum of the resistance offered by the particles of the material displaced. IMPETS; FLOOR (LOAD OF A).

G. R. B.

IMPAGES. A word frequently used by VITRUVIUS, iv, 6, as part of a door, and thought by PHILANDER to signify the fillets or moldings which go round the panels. *Impages*, however, are the rails, as explained *s. v.* FORIS.

A. A.

IMPASTATION. A term used about 1700-50 for a work made of stucco or stone beaten to powder and wrought up like a paste. To which definition is added that "some are of opinion that the huge obelisks and antique columns still remaining in different parts of the world, as also those vast stones at Stonehenge, were made by impastation or fusion."

4

IMPENETRABLE ANTICORROSIVE PAINT, see VANNERMAN.

IMPERFECT ARCH. A term formerly used to define that form of arch which has its centre below the line of springing. Thus a segment of a circle was so called; and the name

'scheme' or 'skeen' (It. *scemo*, incomplete; Fr. *arche en portion de cercle* or *arche surbaissée*), and also 'diminished,' have been given to it.

4. 19.

IMPERIAL. A word used by French architects to express that a roof or dome is pointed towards the top and widened towards the base like a regal crown.

6. 25.

IMPERIAL MEASURE AND WEIGHT, see MEASURES AND WEIGHTS.

IMPERIALS. A name given to a size of slates above 24 ins. by 12 ins. which are called duchesses. They are 30 ins. by 24 ins., and are laid to a gauge of 13½ inches; their computed weight per thousand (*i. e.* 1200) is 3 tons. A ton will cover two square and a half, and 43 are allowed for a square at this gauge. Some slates from Port Madoc (Festiniog district, North Wales) above 26 ins. by 15 ins. in size, whose computed weight of 1200 is 4 tons, are called 'queens', and vary in length from 28 ins. to 36 ins, but are generally made without any fixed width, provided they are over 15 ins. There is no computed weight as they are sold by weight only. About six slates 26 ins. by 15 ins. are produced from a block one inch thick.

O. H.

A ton of imperials 30 ins. long and 24 ins. wide, will usually cover from two squares and a quarter to two squares and a half; and 48 slates of this size are allowed to cover a square. One hundred slates from Port Madoc 24 ins. by 14 ins. covered a square of roofing, and weighed only 460 lbs., but these were especially picked.

A. A.

IMPERVIOUS. A body is said to be impervious when it is not susceptible of admitting the passage of a liquid between its molecules; or when it is of a nature to resist the absorption of moisture by capillary action. Strictly speaking, hardly any substance can be considered impervious, for all of them, more or less, are capable of absorbing water: all bodies having the character of open grain, loose crystallisation, and with tubes in their substance, are distinctly of the class called 'pervious.' The metals, slate, marble, and even the best hydraulic limes resist that action with sufficient energy to be entitled to be considered impervious. Hence the employment of the metals for the purpose of retaining water; and the various uses that are made of the slates, marbles, clays, and limes, employed wherever it is necessary to place a substance that should oppose the passage of water. ATMOSPHERIC INFLUENCE. Bodies pervious to heat are known by the name of diathermal; and the opposite to these are in the class of the bodies impervious to heat. There are also bodies that are permeable by light and called *diaphanous*; the opposite to these are the *opaque* substances. The laws of the transmission of both these fluids are similar to those which regulate the passage of water through a body, and therefore their further consideration is reserved for the article PERMEABILITY.

G. R. B.

IMPETUS. The force with which a body moves. It is composed of the weight of the body, multiplied by the velocity at the time of the contact. The impetus of the wind and of the waves is to be taken into serious consideration in designing buildings that are to be opposed to them, as noticed more in detail, *s. v.* IMPACT; but the most serious effects of this description are those which arise from bodies striking an edifice with either an initial velocity or with a gradually increasing velocity, owing to the effects of gravitation.

G. R. B.

IMPINGE. The term used for the action of one body falling upon another body, in whatever direction it may be; thus the line of impact may be either direct or inclined: in the latter case, the angle of incidence is always equal to the angle of reflection. The action of impact is said to be the object of the verb *impinge*, and the laws of *impingement* are discussed *s. v.* IMPACT.

G. R. B.

IMPLUVIUM. This term in its strict sense as defined by FESTUS, *s. v.*, means "the place into which runs the water collected from the roof." This is the sunk part of the floor

generally found in the centre of the *cavædium* in Pompeian houses. From *TERENCE, Eunuch*, iii, 5, 41, it seems to mean the opening between the eaves, and not this sunk part; for he notes the circumstance of Jupiter coming by stealth to Danaë through the impluvium. The principal features of this part of the house have been given *s. v.* ATRIUM; CAVÆDIUM. A. A.

IMPOST (Sp. *imposta*; Fr. *imposte*; Ger. *kaempfer*). This term is the naturalised Italian word *imposta*, which meant originally a door post, but in English the capping from which an arch starts. The term PLAT-BAND may be synonymous for the capping, but SPRINGER has a very different meaning. The Fr. *imposte* is also used, as would seem to have been the case with the It. *imposta*, for the fixed head which in a doorway or a window serves to fill any space above the usual height of the movable leaf. It has long been the name used for the stone crowning a jamb, pilaster, or pier, and receiving an archivolt or arch-moldings. In Roman work it is marked by a projection from the wall, whether this impost be plain like part of a plat-band or string-course, or molded like the capital of a pilaster or the abacus of a console. The Italian masters have generally assigned to the impost of a pier a certain set of moldings suitable to the particular order with which the arch might be employed. In very large works the entablature of an order serves as an impost. The French architects use the phrase *imposte ceintrée* for any plat-band or string-course which returns as the archivolt; as well as for any plain or molded impost running round a curved plan, such as that of a niche. They express by *imposte coupée* a string-course to arches stopped by pilasters or columns: and by *imposte mutilée* such a string-course, when its projection is diminished so as not to run over an adjoining break or a pilaster. INCUMBA.

To these clear proofs of the usual acceptance of the term, it may be added, that the point of support of the arch or its junction with the pier, has the It. *imposta* expressly devoted to it, and WILLIS, *Remarks on the Architecture of the Middle Ages especially of Italy*, 8vo., Cambridge, 1835, p. 28, proceeds to use the word as relative to the way in which the junction of an arch and its support is managed with respect to the decorative parts. He observes, that "the simplest impost is that, in which the moldings of the arch are continued without interruption down the uprights. If we consider the common Grecian square headed doorways as flat archways, the architrave moldings constitute *continuous* impost: this impost is very common in the later Gothic, and is to be found mixed with others in all the periods; in the late examples of the cathedrals at Orleans and Louvain it occurs throughout the building. The decorative impost, or point at which the ornamental impost moldings are placed, is frequently below the springing, in which case the arch is said to be stilted. In some archways the impost point is ornamented with horizontal moldings upon which the arch moldings stop; below these is a shaft, which may be of any form and decoration, and may or may not have a capital to which the impost moldings serve as an abacus, or in Romanesque and earlier buildings as a kind of entablature. These impost are divided into two classes, which may be called *shafted* and *banded*. The commonest form has the section different from that of the arch, and generally much plainer. The second form has the section the same as that of the arch, so that the shaft appears to pierce through its capital and to be carried over the arch; this latter form is used nearly to the exclusion of every other in the Gothic of Italy.

"In another class, the moldings of the arch whilst different from that of its pier, mutually die against each other. In its simplest form the uprights have plain chamfered edges, and the arch a quantity of rich moldings dying against their upright faces: this impost is never found in Italy; it may be distinguished by the term *discontinuous*.

"It appears, then, that the impost in the middle ages may be divided into four classes and distinguished by two characteristics: similarity or dissimilarity between the moldings of an

arch and its uprights, and the absence or presence of impost moldings or capital. The following table may serve as a summary of this classification;—

| Impost moldings or capital. | { Absent Present | Moldings of Arch and Uprights. | |
|--------------------------------|---------------------|---------------------------------|--|
| | | Similar Continuous Banded | Dissimilar Discontinuous Shafted |

These adjectives will apply either to the impost, archways or ribs, so that whether we speak of a banded archway, discontinuous impost, or shafted ribs, the arrangement is equally convenient. When arches or ribs spring from a corbel these distinctions vanish; but such arrangement may be called a *corbelled impost*. Some archways have what may be termed double impost; that is, one placed over another, so that the moldings of the pier continued through the capital as in a banded impost, meet arch moldings which have different moldings that die against the pier: this may be described as a discontinuous impost placed over a banded one; or, for conciseness, the whole may be termed a discontinuous-banded-archway. Again, there may be a discontinuous impost, with lower down a kind of capital and corbel, forming a corbelled impost: this, with corbels or shafts, is a favourite arrangement in the after Gothic of Germany, and may sometimes be found in our own."

IN ANTIS. A name given to those temples, the pronaos or entrance porch of which was formed by two antæ or pilasters and two columns. The precise meaning of the word has been a subject of discussion among the commentators on *VITRUVIUS*, iii, 1, and iv, 4. Some having had plausible grounds for stating that the *ANTÆ* proper were only engaged pilasters, and whether placed at the angles of a building such as a cella, or at the ends of the *pteronata* or wing walls, it was apparently a matter of indifference. *GWILT, Encyc.*, mentions angular antæ being such as shew only two faces on the walls of a temple. An authoritative explanation of the term 'a temple in antis' was obtained on the discovery of the executed examples at Rhamnus, at Eleusis, and at Agrigentum (the modern Girgenti), as described in those articles. A monument of a similar arrangement is shewn in *BLOUET, Morté*, fol., Paris, 1836, pl. 50-L. *COCKERELL*, in *Proceedings* at Winchester of the Archaeological Institute, 1845, p. 33, notices that the church in the castle built 1158 at Nuremberg; and the *Frauenkirche*, in the centre of the city, probably of later date, "are exact illustrations of the temple in antis of *VITRUVIUS*, as given in the edition of his work by *CESARIANO*, iii, 52." The arrangement has been often followed in modern times, as at Covent Garden church by *Inigo Jones*; the Belvedere of six columns in *antis*, and the *hauptide* with a hexastyle portico in *antis* by Schinkel, both at Dresden: the Brandenburg gate at Munich; the gate to the North Western railway station at Euston-square, etc.

IN AND OUT BAND. A term used in the North of England and in Scotland, in masons' work, for the construction by headers and stretchers, of quoins, and window or door jambs (rybats); the in-band stones being headers, and the out-band stones, stretchers. The words are sometimes written 'in and out bond', and also 'in and out tie'.

J. J. T.
INCEPTOR. On a stone on the east side of the cloisters of Norwich cathedral, under the window north of the door to the chapter house, 1297, are the words "✠ Ricardo Uphalle *hujus opis inceptor me posuit*." William BODNER, *Itin.*, 1478, gives this inscription, and states "R. Uppehale fundatore predicti operis," for which reasons the design of these cloisters is attributed to him: *BRITTON, Norwich*, 4to., London, 1816, p. 38. The proper meaning of 'inceptor' seems to be given by a notice elsewhere of Christopher Slec, prior, "qui primus hoc opus fieri incipit (*sic*), 1428." INCHOAVIT.

INCERTUM OPUS. Masonry, where the stones were of irregular lengths and heights, but which were bedded and bonded. IMBRICATUM. A. A.

INCH (Ang. Sax. *ince*, probably a corruption of the Lat. *uncia*). The twelfth part of an English foot, as used in measures of length. The inch formerly was the length of three barleycorns, round, sound, and out of the middle of the ear. Its length is now determined by the standard yard, of which it forms the thirty-sixth part. FOOT; YARD. A. A.

INCHOAVIT. One of certain terms used in mediæval documents respecting the commencement of the erection of buildings: thus "Ipse (Ernulfus) fecit dormitorium novum et necessarium et capitulum perfectit quod inchoatum erat, et rectorium inchoavit." HUGO CANDIDUS, *De Burgo S. Petri*, in SPARKS, *Hist. Anglie. Script. Varii*, fol., Lond., 1723, p. 66.

INCH STUFF. Boards cut out of deals, planks, and logs. In fir, three thicknesses of inch stuff are cut out of a 3 in. deal, the thickness of each board, after allowing for saw kerf and planing, being barely $\frac{3}{8}$ in. net thickness. In hard woods, the sawyer pricks the divisions on the log one inch with the compasses, which is reduced by the saw kerf, etc., as before. The value may be ascertained in the following manner: suppose a 12 ft. deal 9 ins. by 3 ins. to be worth, after adding for sawing (two cuts), other expenses and profit, 6s. 9d., the produce being 27 super. ft., the price per foot superficial in the rough without waste would be 8d.; the proportionate prices of other thicknesses as obtained from WALE'S *Tables*, are as follows:—

| | | | | | |
|--------------------|---|---|--------|--|--|
| $\frac{1}{4}$ inch | - | - | 1-69d. | | |
| " | " | " | 2-03 | | |
| " | " | " | 2-34 | | |
| 1 | " | " | 3-00 | | |
| " | " | " | 3-61 | | |
| 1 | " | " | 4-20 | | |
| " | " | " | 4-97 | | |
| 2 | " | " | 5-67 | | |
| " | " | " | 6-33 | | |
| " | " | " | 7-01 | | |

When measured in work a considerable allowance in price is required for waste, varying from one-seventh to one-fourth, according to the quality. Of what is technically called "clean deal," viz., without sap or knots: the waste in listing and selection is very great.

In mahogany, the boards being cut out of logs, the sawing bears a different proportion. After ascertaining the value of inch by calculating the average production of a log, and adding for the several expenses, etc., the proportion as ascertained from the before mentioned tables would be (if inch stuff be taken at 1s. per foot) as follows:—

| | | | | | | | | |
|--------------------|---|---|--------|-----------------|---|---|---|-------|
| $\frac{1}{4}$ inch | - | - | 6-72d. | 2 | " | - | - | 22-56 |
| " | " | " | 9-46 | 2 $\frac{1}{2}$ | " | - | - | 25-20 |
| " | " | " | 12-00 | 3 | " | - | - | 27-44 |
| 1 | " | " | 14-64 | 3 | " | - | - | 33-12 |
| 1 | " | " | 17-28 | | | | | |
| 1 | " | " | 19-92 | | | | | |

The waste in work is from one-tenth to one-eighth. S. J. D.

INCH TOOL. The chisels of carpenters and masons are reckoned by their width at the cutting edge, and called inch, half-inch, etc., accordingly. INCH-TOOLED WORK is therefore the face given to granite with such a tool to remove the rough face as left by broaching. BOASTER; BROACHED WORK; CHISEL.

INCIDENCE (ANGLE OF). The angle made by the line of direction in which one body strikes upon another, and by the plane of the surface struck upon. The "angle of reflection" is that angle made with that plane by the line the body rebounds along. The angle of incidence and the angle of reflection are always the same, assuming that the surface struck is unyielding.

INCISED WORK. The term usually applied to patterns marked in lines only, upon a hard material, like the letters in ancient inscriptions on marble or stone. Although the hieroglyphics of Egyptian sculptors are (on a small scale) perfect examples of this definition, they are considered as a branch of sculpture when, being executed on a large one, the surface comprised within a circle or other figure is slightly rounded. Somewhat similar is the execution of the wreath shown in INWOOD, *Erechtheion*, fol., London, 1827, pl. 24, where the ornament was outlined by a sinking, the leaves and fruit being worked out of the face. Other examples occur in Greek work,

where the outline of ornaments is found very faintly traced with a fine chisel, as on the cyma recta of the Parthenon, which is now regarded rather as preparation for the painter than as unfinished sculpture. Incised lines of considerable width have been used for decoration, as described s. v. GROOVE; but notice is taken in the *CIVIL ENGINEER Journal*, 1849, xii, 158, of a rubbing from the frieze of an Elizabethan mantel-piece discovered at Wiarton House, near Staplehurst, in Kent, where the pattern had been very slightly incised in the stone; it was commonly done on wainscot at the same period: somewhat similar work has been mentioned s. v. ENTAIL and HATCHING. The fragments of the plan of Rome, now in the Capitoline museum, anciently formed the incised pavement of the temple to Remus (now part of the church of SS. Cosmo e Damiano); it does not date earlier than about 215 A.D.; but PLINY, xxxvii, 61, noticing a 'pavimentum sculpturatum' in the temple to Jupiter on the Capitol, shows that a much earlier date, B.C. 149, can be given to the employment of this kind of work for pavements.

INCLINATION OF THE AXIS OF A COLUMN. In DAILY, *Revue Générale*, 4to., Paris, 1843, iv, 473, VILLEROI insists that all the columns of all ancient temples of the Doric order are inclined: that the lowest frustum, generally a tenth of the whole height, is part of an oblique cone; that the inclination commences at the top bed of this frustum; that the greatest amount of inclination, i. e. of the angle column, is 24 millimètres per mètre at the Parthenon; that all the other drums are portions of right cones; and that the angle of inclination (α) of each column is proportional to its distance (d) from the point of inclination, so that the most inclined are at the angles, while the least inclined are in the middle of the sides. He adds the following formula for the relation of the inclinations of any two columns;— $a : d :: a' : d'$ or $a \times d' = d \times a' = o$.

Whatever may be the value of the communication just noticed, it must be observed that more guarded language is used by COCKERELL, *Temples of Jupiter Panhellenius*, etc., fol., London, 1860, who observes, p. 24, that the inclination of the axis of the columns towards the cella, which is found to obtain in almost all the remarkable temples in Greece, is a principle worthy of particular remark, both for its obviously rational and agreeable effect as applied to monuments of this nature. He also notices "its uniformity with the assurance of VITRUVIUS, derived from the practice of the Grecian architects; and although he speaks of it with reference to the Ionic order only, it can never be doubted that this important principle applied equally to the Doric and all other orders, as indeed the existing monuments sufficiently prove." The words of the Latin writer, iii, 3, may be translated as follows; "The bascs being completed and fixed, the middle columns of the pronaos and posticum are to be placed with the axes perpendicular, but the columns at the angles and those which will be in a line between them on the flanks of the building to the right and left (are to be so placed) that the inner portions which face the walls of the cella may have the side placed upright; while the outer parts (follow) in accordance with their being drawn inwards (? diminished), for thus are the figures of the composition of temples completely arranged by a proper method of contraction." This is one of the most corrupt passages in VITRUVIUS; but there is no doubt upon the two great points involved; viz., the inclination of the axes of the flanking columns, and the perpendicularity of those on the end fronts. In the supp. volume to STUART and REVETT, *Antiq. of Athens*, fol., London, 1830, the passage is rendered somewhat differently, but to the same effect, and thereon it is observed by DONALDSON, that "the axes of the columns of the Parthenon, both on the flanks and on the fronts, as well as those of the temple in Ægina, and of Concord at Agrigentum, have a considerable inclination inwards (a circumstance I am not aware to have been before noticed), though not to such a degree as required by VITRUVIUS, and not confined, as he directs, to the columns of the peristyles only." And in the same volume, JENKINS says

with respect to the preceding directions, "we found them corroborated in some measure, though not to the extent prescribed by VITRUVIUS—by the Parthenon, the temples to Theseus, Jupiter Panhellenius at Ægina, the triple temple at Athens, the choragic monument of Lysicrates, etc."

Although this inclination does not exist in the remains of the temple to Jupiter Olympius at Athens as noted by PENROSE, *Principles of Athenian Architecture*, fol., Lond., 1852, pl. 37, yet the external columns of the Parthenon, Propylæa, The-seum, and Erechtheum, all situate in that city, are found not to have their axes perpendicular, but to be inclined inwards, according to PENROSE, who relates, p. 35, that his investigations on the eastern front of the Parthenon give 0.249 ft. as the deviation of the axis of the shaft, less 0.018 ft. for the whole column, because the axis of the capital is not in the same line as that of the shaft, but is perpendicular to the lines of the horizontal curvature, and consequently leans forward in a contrary direction to that of the shaft. This adaptation, while it considerably facilitated the working of these members, is quite imperceptible to the unaided eye. He observes that another method gives 0.221 ft. and 0.205 ft. for the east and west fronts respectively; and thinks there is great probability that 0.228 ft. was the original amount in the whole height (34.26 ft.) or 1 in 150: identical with the amount of increment of curvature in the fronts, averaging 0.2275 ft.; so that the following simple relations exist; entasis 1, inclination 4, increment, 4, semi-diminution 12. "The inclination of the columns of the Athenian buildings is not so great as that which would result from the rule here given by VITRUVIUS; but as he is speaking of the Ionic order in which the diminution is so much less than in the Doric, it is evident that in some very good examples this method may have been applied without exceeding the actual angle of inclination in the Doric examples." In the column from the northern portico of the Erechtheum, the inclination is much less than the semi-diminution, as shown in pl. 14 of the work cited.

There is obviously an error in WILKINS, *Civil Architecture of Vitruvius*, fol., London, 1812, p. 40, where he says in reference to this principle that it is nowhere found adopted in peripteral temples; and its existence at the temple of the Sibyl at Tivoli is not sufficient for inducing a belief that the practice was commonly adopted.

With regard to the discrepancy between the Greek structures and the Latin texts above translated, it may be observed that COCKERELL, p. 24, mentions two examples with this inclination at Rome; viz., the buildings called the temple to Mars (the custom-house) and the temple to Mars Ultor (at the Arco de' Pantani) as cited to him by Gauthier, who noticed that this inclination was given on the sides, but not to the columns of the front and rear faces.

For other cases of inclined work, reference may be made to the articles LEANING TOWER, and OPTICAL EFFECTS.

INCLINATION (ANGLE OF), see ANGLE.

INCLINATION OF THE FACE OF A WALL. With regard to any early instances of the use in Egyptian art of inclined or battering planes in building, it is observed by FREEMAN, *History*, 8vo., London, 1849, p. 77, that the "pyramid must not be taken alone, it is but the most perfect development of a tendency which pervades the whole style, namely, that of sloping every surface that can by any possibility be made to slope. Thus we have the slanting walls at the side of the portico, the propylæa with their four converging walls; we may even add the doorway, whose jambs so frequently incline inwards—the only part escaping is the front of the portico. A colonnade with its pillars sloping inwards would be too ludicrous, and too great a violation of apparent, and perhaps real, safety even for Egyptian taste."

It is not perhaps worth while to do more than indicate the section of the phryctorium, or beacon-tower, near Argos, given in the supp. volume to STUART and REVETT, *Antiq. of Athens*,

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fol., London, 1830, p. 22, by DONALDSON, who notices that "this is one of the few ancient examples to be found of a wall whose external face diverges from the perpendicular so rapidly towards the foundation: a tower near the grave of Æsculapius, and part of the citadel of Chæronea, have a similar peculiarity of construction," which was continued in military architecture even by the mediæval builders, and indeed to the present day.

INCLINE. This word properly means a deviation from a vertical line; but in civil engineering it has become synonymous with the term slope (GRADIENT); the expressions in general use are "down the incline," and "up the gradient." The angle of elevation of a roof (PITCH; SLOPE) is equally erroneously termed an angle of inclination.

INCLOSURE COMMISSION. This board was constituted by the General Inclosure Act of 1845, 8 and 9 Vict., c. 118, for the purpose of carrying out its provisions for facilitating the inclosure and improvement of waste lands, exchanges and partitions, and the completion and rectification of inclosures under general and local Inclosure acts. Nine amendment acts have since been passed, viz.:—

| | | | |
|---------------------------------|---------------------|----------------|--------------------|
| First, 1846, | 9-10 Vict., c. 70 | Fifth, 1851, | 14-15 Vict., c. 53 |
| Second, 1847, | 10-11 Vict., c. 111 | Sixth, 1852, | 15-16 Vict., c. 79 |
| Third, 1848, | 11-12 Vict., c. 99 | Seventh, 1854, | 17-18 Vict., c. 97 |
| Fourth, 1849, | 12-13 Vict., c. 83 | Eighth, 1857, | 20-21 Vict., c. 31 |
| Ninth, 1859, 22-23 Vict., c. 43 | | | |

The fifth amendment act consolidates this commission with the Copyhold and Tithe commissions, which consolidated commission is renewed from time to time by parliament. The sixth amendment act specifies the short title of all these acts as "The acts for the inclosure, exchange, and improvement of land."

The course of procedure in order to obtain an inclosure under these acts is for the owners of one third in value of the interests of the land proposed to be inclosed, to apply to the commissioners who, if they deem fit, send down an assistant commissioner to inspect the land proposed to be inclosed, to make inquiries, and to hold a meeting to hear any objections. On his report the Inclosure commissioners, if they are of opinion that the proposed inclosure would be expedient, make a provisional order in which are set out the conditions as to allotments for exercise and recreation for the labouring poor, the reservation of minerals, the proportion to be allotted to the lord of the manor in respect of his right and interest in the soil, if he is entitled thereto, and any agreement between him and the commoners. This order, to which the consent of two thirds in value of the whole interest in the land and also the consent of the lord of the manor (if the land is waste of a manor) is required, is deposited in the parish; and if necessary further meetings are held for the purpose of verifying the consents: the expediency of the proposed inclosure is then certified by the commissioners in a report laid before parliament; and when the sanction of parliament has been obtained, a valuer is appointed by the landowners to proceed with and complete the inclosure on the terms and conditions specified in the provisional order. The valuer proceeds to hold meetings to receive claims and objections to claims, which are examined and determined by him at a subsequent meeting, when if he require it, an assistant commissioner sits as his assessor: his determinations are deposited at some public place in the parish, and are subject to appeals to the commissioners and to the courts of law. When all claims are determined and any boundary disputes which may have arisen are settled, the valuer makes his report, accompanied by a map, in which is set out his scheme of allotments; this report and map after being examined at the Inclosure office is deposited for inspection; and an appeal meeting is then held by an assistant commissioner to hear objections to the same. When these are finally disposed of, the award is signed by the valuer, and when confirmed by the commissioners it becomes a conclusive document. In the matter of an exchange, partition, or division of inter-

mixed lands, after the application has been examined, and advertised for three successive weeks in a local newspaper, three calendar months must elapse before the commissioners can confirm the order.

Under the above named acts, powers are also given to the commissioners to divide monies paid as compensation for common rights, under the Lands' clauses acts: also to approve awards declaring the boundaries between leasehold and other lands, and between copyhold and customary land and freehold land respectively. COOKE, *Acts for facilitating the Inclosure of Commons*, 4th edit., 12mo., London, 1864.

The Inclosure commissioners also have jurisdiction under the Land Drainage Act, 1861. After receiving a petition from the proprietors of one-tenth part of the land in any district, they appoint an inspector to visit the land, and to hold a meeting for hearing objections; from his report they recommend, if they consider it to be advisable, that a commission of sewers be issued or a drainage district formed, as may have been applied for; in the former case, the commission will issue from the Crown Office, in the latter, the sanction of parliament to the provisional order is necessary. This act also gives power to the Inclosure commissioners after a similar investigation, to issue a provisional order (which must be confirmed by parliament) to allow a commission of sewers or drainage district board to put in force the compulsory powers of the Land Clauses Consolidation Act, 8 Vict., c. 18, for the purpose of purchasing any land for new works: under this act also, private owners can procure improved outfalls for their lands. THRING, *Land Drainage Act of 1861*, 12mo., London, 1862.

The Inclosure commissioners have also jurisdiction under the Four million public money loan act 1846, formerly granted to encourage agricultural drainage and improvements, but which is now nearly exhausted; and under the Improvement of Land Act, 1864, they supervise the exercise of the powers granted to landowners whether owners in fee or with limited interests, to charge their estates by way of rent charge for a limited number of years and with priority of charge, with the cost of drainage and farm buildings and other improvements, which increase the value of land for agricultural purposes, viz., roads, railways, canals, embanking, warping, reclaiming, planting for shelter, clearing, irrigating, and construction of landing places or jetties for the transport of cattle, etc. ANONYMOUS, *Notes Explanatory*, pamphlet, 8vo., London, 1864.

The following is a list of all the public drainage and improvement acts under which the commissioners have control;—

| | |
|--|-------------------------------------|
| First Public Money Act, 1846, | 9-10 Vict., c. 101; 10 Vict., c. 11 |
| The English Drainage Act, 1847, | 10-11 Vict., c. 38 |
| Act to Simplify Advances, 1848, | 11-12 Vict., c. 119 |
| Private Money Drainage Act, 1849, | 12-13 Vict., c. 100 (repealed) |
| Second Public Money Act, 1850, | 13-14 Vict., c. 31 |
| Scottish Emigration Act, 1851, | 14-15 Vict., c. 91 (concluded) |
| Public Money for Improvements Act, 1856, | 19 Vict., c. 9 |
| Land Drainage Act, 1861, | 24-25 Vict., c. 133 |
| Improvement of Land Act, 1864, | 27-28 Vict., c. 114 |

They have moreover the administration of ten private acts of parliament authorising different companies to advance money on similar conditions for improvements, which are as follows:—

| |
|---|
| Landowners' Inclosure Company, 10-11 Vict., c. 212 (not existing) |
| West of England Company, 11-12 Vict., c. 143 |
| General Land Drainage and Improvement Company, 12-13 Vict., c. 91 |
| Lands Improvement Company, 16-17 Vict., c. 154; 18-19 Vict., c. 84: 22-23 Vict., c. 82; 26-27 Vict., c. 140 |
| Scottish Drainage and Improvement Company, 19-20 Vict., c. 70; 23-24 Vict., c. 170 |
| Land Loan and Emfranchisement Company, 23-24 Vict., c. 169 & 194 |

In the supervision of these agricultural improvements they appoint inspectors to visit the lands proposed to be charged with the cost of the improvements, who report to them; and in the case of buildings, plans and specifications have to be deposited with the commissioners; these are thoroughly examined by their architects as to durability, arrangement, and sanitary requirements; and are duly checked as to cost, the fullest

proof being required that the work is of a profitable character. If approved, the commissioners issue a provisional or sanctioning order that the works may proceed; and when the inspector certifies that they are satisfactorily executed, an absolute order is issued charging the cost upon the lands, and the company can advance money to be repaid by a rent charge upon the lands for periods varying from 25 to 31 years. The expenses incident to the application, or such part of it as the commissioners think fit, are included in the order.

The Inclosure commissioners have also the jurisdiction in numerous statutes of a special or transitory character, which are for that reason not here given.

J. J. T.

INCLUSA, INCLUSAGIUM, INCLUSERIA, INCLUSORIA, and INCLUSORIUM. These seem to be variations of a late Latin name for the cell occupied by a person who was really reclusive; i. e. voluntarily devoted to a solitary life: but it must be mentioned that they are sometimes supposed to be equally applicable to a monastery. It appears that 'clusa' and 'clusorium' were synonymous with them: and DUCANGE, *Gloss.*, citing BUSCHTUS as using first 'inclusorium' and then 'anteclusorium,' quotes other works for "clausus est in clusorio iuxta ostium majoris ecclesie"; and "inclusa id est domus inclusi debet esse lapidea longitudo et latitudo in xii pedes, habeat tres fenestras unam contra chorum per quam corpus Christi accipiat, alteram in opposito per quam victum recipiat, tertiam unde lucem habeat quæ semper debet esse clausa vitro vel cornu". ANCHORIDGE.

INCOMBUSTIBLE. The term is applied to a material that in its natural state will not burn. Many attempts have been made to render wood and other articles incombustible. AULUS GELLIUS states that Sylla endeavoured in vain to burn a wooden tower defended by Archelaus, one of the generals of Mithridates, because it was soaked in alum. GREGORY of Tours notices, that certain wooden vessels withstood the fire as well as those of iron, but the process is not mentioned. HALES 1743-58 proposed to cover floors with an inch of earth, through which fire would be two hours alight before burning the boards. Soubeyran of Montesorgues in 1759 and Didelot in 1781 made several trials to render houses incombustible, but without success. Dr. FOCHUS, of the academy of science at Munich, states that an equal quantity of argillaceous earth or clay mixed with lime and water to the consistence of thin plaster, then evaporated to dryness and subjected to the heat of a lime kiln furnace, was found on being mixed up to a proper consistence, and applied to timber, to dry as hard, and present as compact an appearance, as Portland stone.

An incombustible cement, made of lime, sand, and hay cut very small, and laid over wood, was found to prevent it taking fire after having been two and a half hours alight; the experiment was tried in S. Petersburg 18 October 1779; SCOTTS MAGAZINE, xlii, p. 7. Three measures of hay cut into three inch lengths, with one of sand and two of slacked lime, beaten up well, and used stiff but not too dry for spreading it, was part of Lord Stanhope's pugging for fireproof floors.

The saturation of timber or any other combustible substance, with a solution of soda and potash, is stated to render them completely fireproof; and a patent was granted to B. Cook of Birmingham 16 April 1823 for this discovery: the method of effecting this purpose is described in the REPERTORY OF ARTS, etc., xlv. Either of the alkalies separately will have the same effect, as also a solution of alum. Borax has been applied for this purpose, as noticed s. e. A solution of silicate of potash commonly called liquor of flint, may be laid on timber with a brush in a highly diluted state, two or three times, letting the wood become dry each time; after which a coat of common whitewash is applied, and this again, when dry, is fixed by the concentrated solution. In 1849 soluble glass is described as coming into use for covering wood and rendering it nearly incombustible. It is composed of fifteen parts of powdered quartz, ten of potash, and one of charcoal. These are melted together,

worked in cold water, and then boiled with five parts of water, in which it entirely dissolves. When applied, it gelatinises as it cools, and dries into a transparent colourless glass. A silicate of lime or baryta, precipitated by Ransome's process in such a manner as to close the pores of the wood, might be found very advantageous to farm buildings built of timber, and to bressumers, joists, etc., in house building. ALUM assists in rendering linen and some other materials unflammable. The effects of Sylvester's patent compound for the same purpose, was shown at the Philharmonic hall, Islington, March 1865, with great success. Sulphate of copper is considered to have similar properties; *BUILDER Journal*, 1863, xxi, 323. ANTI-PYROTIC COMPOUND; FLAMMABILITY.

ANONYMOUS, *Various Methods to Prevent Fires in Houses and Shipping*, etc., pamphlet 8vo., London, 1775, published by J. Southern.

LEWIS, *Fireproof Materials*, in *Transactions of the Royal Institute of British Architects*, 1864-5, p. 120, notices that "as to making wood fireproof, many schemes have been suggested, and one (by Henry Wood) was reported on favourably, though with some qualifications, by the Associated Architects in 1793. I am quite unaware of what the composition was, but it seems to have been applied externally (as a covering in a liquid state). Some of the others I have tried, but I cannot say that any are quite successful. The external application of water glass was strongly recommended at one time; but I tried it on a rather large scale after the exact directions of the patentees' agents, and was sorry to find that I could not perceive the least benefit from it. Ransome's system is certainly better; it is carried out by an external coating put on like paint, and very clearly stands the action of the flames for a time—it soon blisters. By the use of Sir W. Burnett's patent there is the great advantage of the wood smouldering only, and thus of not communicating to the neighbouring parts of the fabric the fire by which it is itself destroyed; an extra solution to the ordinary process against decay is required for this purpose."

INCONSISTENCY. This word is employed to express the condition of contradiction subsisting between two things; it includes the ideas of incompatibility and incongruity, as well as of absurdity or contradiction to reason. It is, however, employed by some persons in a sense which is not apparent, for example when Mahometan artists are described as using 'fantastic and inconsistent forms'. The meaning does not become more evident when the phrase, altered into 'forms repugnant to each other', is employed by those, who see beauty in the sharp contrast of lines afforded by a triangle combined with a trefoil, or by a square with a quatrefoil. Perhaps the truest application of the term 'inconsistent forms' is in the case of a classic capital directly carrying a mere block of the same diameter as the shaft, if it be true that the adoption of the outlines of these capitals was originally decided by their fitness to reconcile the vertical line of the shaft with the immediately antagonistic horizontal line of the entablature. When the block extends to the width of the abacus of a suitable capital, the work may no longer be inconsistent, even where the block is the springer of an arch, and especially of a horseshoe arch.

The same, and other, critics use the word in any case where the features of the construction of a building are not apparent: they brand with the name of inconsistency a veiled construction by discharging arches, upon an apparent construction by bressumers; a plastered ceiling; a window lighting two floors; windows of one size to rooms of different dimensions; a plastered wall worked in imitation of stone; and a wall carried upon an iron girder, itself supported by thin posts put out of sight. Those who consider that the gothic and modern builders have persistently erred in walls so thin, or arches so badly constructed, as to require iron ties or flying buttresses, brand these also as examples of inconsistency. They extend their disapproval to features which appear as construction but

are merely decoration, such as buttresses erected for display long after the edifice has shown its independent stability; to materials whose known weakness is inadequate to the presumable load, as flat stone lintels over cusped apertures, or shafts of serpentine under weights that must either really be corbels in themselves or would crush the shaft; and to strong materials in places where little weight is imposed, as metal shafts under mere tracery, or granite shafts under broken entablatures. In short, 'inconsistency' has become an euphuism that enables the word 'sham' to be avoided. Another case of inconsistency is afforded by the injudicious employment of materials; as where domes of brick or stone, instead of timber or iron, are built upon polygonal plans.

The use of details that have been recognized as appropriate to one style or phase of a style, in any other phase of that style or in a different style, is also considered to be inconsistency by those who object, as much to Romanesque details in gothic work as to gothic outlines with classic ornament: and these purists include in this judgment the employment of the beautiful forms of Greek art in any building which exhibits arcuated construction. But they seem to be opposed by those who hold that there is no such real inconsistency between the phases of a style as to render their mixture, by an architect in his design, offensive to any but a technical eye: this indeed is an opinion compulsorily expressed by all indiscriminate admirers of our glorious cathedrals.

One of the most esteemed historians of architecture has considered a timber roof over a stone vault to be a gross example of inconsistency, whether it be perpetrated in London or in Westminster; a decision that may be impugned by those who see no such fault in an open traceried spire over a lead flat.

But of all expedients that have been deemed to be inconsistencies, none has been so frequently committed and so virulently condemned as the false portions of façades of cathedrals, churches, and chapels; as executed both in mediæval and modern times.

INCRUSTATION. This word, as meaning a coat of one material applied to another, appears to include ashlar and plastering, if not gilding and painting, quite as much as the enamelling and veneering, which, alone, are mentioned in some works as examples of incrustation: the *Fr. boule* and the *It. tarsia* would even have a right to be considered under the same title. But it is better to accept the word as applicable to marble alone; and to say that a thin slab of marble is incrustated upon a body of slate or stone; reserving 'damascening' for metals; 'enamel' for fused pigments; and 'veneer' for woods—while *boule* and *tarsia* like Florentine mosaic belong to the class of INLAID WORK. VENKER; WALL VEIL.

The system of incrusting with marble does not seem to have been known at Rome in the time of VITRUVIUS, whose remark, ii, 8, that the palace of Mausolus at Halicarnassus had brick walls plastered "tectoriis operibus expoliti," with dressings, etc., of Proconnesian marble, appears to have been carelessly rendered by PLINY, *H. N.*, xxxvi, 6, who actually says, "Secandi marmor in crustas nescio an Carie fuerit inventum; antiquissima quod equidem inveniam, Halicarnassi Mausoli domus Proconnesio marmore exulta est, lateritiis parietibus." Great part of the observations upon this subject in QUATREMÈRE DE QUINCY, *Dict.*, are equally wrong inferences from other statements made by PLINY as matter of his own knowledge. In fact, the last named author, xxxvi, 8, speaking of the theatre built 58 B.C. by M. Æmilius Scaurus, admits that he does not know whether the marble there employed was in blocks or in slabs; marmoreos parietes—non facile dixerim sectos an solidis glebis positos—nondum enim secti marmoris vestigia invenerat Italia; but xxxv, 1, he has a passage which completely justifies the restriction, above suggested, of the meaning of the word: he mentions inlaying one marble with spots of another, "maculas quæ non essent in crustis inserendo unitatem variare," as a practice that was common in the time of Nero, and super-

seded the process of painting or staining stone, which he says arose in the time of Claudius. Much to the same effect are the observations of *SENECA*, *Ep.*, 86, which will be considered *s. v.* *INIAID WORK*. The present mode of cutting a block of marble into slabs (Gr. *πλάκα* as pl. of *πλάξ*, apparently connected with Fr. *planches* and *plaques*) by a saw, appears to be described by *PLINY*, *xxxvi*, 9, who notices the loss that is sustained when too coarse a sand is employed.

INCUMBA. *VITRUVIUS*, *vi*, 11, describing arched construction says, "the outside piers should be wider, that they may resist the force, when the voussoirs, pressed by the weight of the walls and pressing through their joints to the centre, might throw out the *incumbæ*." In all probability the word is derived from *incumbere*, to lie down on, to press down, and as a substantive means that which is pressed down. Some writers have believed the *incumbæ* to be the voussoirs themselves; but pressure on these would tend to throw part of them up; the crown the haunch; or the haunch the crown. *PHILANDER* supposes the *incumbæ* to be the imposts, where circular arches are used; or it may mean the skew-backs. A. A.

INDEFINITE CLAUSES. A term sometimes but improperly applied to the general clauses in a specification. Whether they be general or special, all clauses should be definite, clear and intelligible. A list of the usual general clauses is given *s. v.* *CONTRACT*. A. A.

INDENTATION, or *INDENTED WORK*, see *INCISED WORK*. The term has been used for work toothed together, that is, with a projection fitted to a recess, similar to a groove and tongue. 1.

INDENTURE, see *CONTRACT*.

INDIAN ARCHITECTURE. As scarcely any monument of civil architecture erected before 1500 A.D. remains in Hindostan, the ecclesiastical edifices are the guides to the history of the architecture of that country; and this fact leads to a division of the subject into portions corresponding with the different forms of religion to which the buildings belong.

The aboriginal (*i. e.* *Tamul*) devotees to Ophite worship were overpowered in the north by the believers in a Deistical religion, which is supposed to have entered India about 3101 B.C. with a Sanscrit race, and to have become corrupted from Brahminism into Brahmanism after the compilation of the Vedas in the thirteenth or twelfth century before our era. The difference between these terms appears to be, that *Brahma*, with the final syllable pronounced short, is used as a substantive of the neuter gender to designate the essence of the Supreme Being; while *Brahmah*, with the final syllable pronounced long, is used as a substantive of the masculine gender to designate in the Hindoo mythology an individual deity, being a son, with *Vishnu* and *Siva*, of *Maya* produced by *Brahma*.

The corrupted religion lost its official importance when *Asoka* renounced for Buddhism the Brahmanical faith of his father *Bimbisara*, who was a son of *Chandragupta*, the *Sandracottus* of Greek historians. The Ophite worship seems to have remained in the south, and to have so much leavened in the north the Brahmanical faith that, when the Brahmins fled from the Buddhist persecution to the south, they were popular enough (with other results) to prevent there any firm establishment of Buddhism. The history of the new sect is vague until the birth 623 B.C. of *Gotama Buddha* the last of the great Buddhas, who taught his doctrines probably 588-543 B.C.; he was *Sarvatharsiddha*, called *Sakya Muni* or *Sakya Sinha*, the son by *Maya* of *Suddhodana*, a prince of *Magadha* in South *Bahar*, who was himself one of the last of the long line of rulers belonging to the elder branch of the *Arian* or *Sanscrit* race.

It seems to be allowed that, when the monotheistic doctrine was forgotten, Buddhism was an atheistic reform accompanied by monasticism. In its turn it became corrupted; and, during its decline in official estimation after the fall 494 A.D. of the *Andhras* dynasty in *Magadha*, the Brahmanical form of religion attempted to return to power. In the struggle arose the sect of

the *Jains*; which appears to have been an endeavour to arrive at a compromise, abolishing monasticism, between atheism and polytheism; under which an esoteric Buddhist might be safe while a Brahmin might exoterically direct the services: for when the Buddhists were persecuted, the *Jains* were allowed to compete for popularity with Brahmanism which, though perhaps not then divided into three great sects, nor troubled by twenty-one distinct heretical parasites, nor seen in its lowest form, had allied itself with devotion to two other deities who are absolutely antagonistic, *viz.*, of *Siva* and *Vishnu*; forming the curious compound of a faith in which the worship of the destroyer *Siva* is mixed with that of the preserver *Vishnu* (whose ninth avatar is *Buddha* himself) and which is performed by priests who thrice in the day address a special prayer to the creator *Brahmah*, whose name they bear.

Scarcely had this Brahmanical mixture of religions obtained the dominion generally in India, when the country was attacked by the *Mahomedans*; and it is hardly possible to fix the date at which it can be said that *Christian conquerors* began to lead a fashion of building in that country.

Having thus given this necessary preface, it may be noticed that the history of architecture in India is commenced by *Fergusson*, *Illustrated Handbook*, 8vo., London, 1855, p. 7, with the *ldts* carrying the edicts of *Asoka* about 250 B.C., which recognise Buddhism as the religion of the state. It will be seen in the course of this article that there is some doubt upon the propriety of adopting these monuments as works of *Hindoo art*, which is assumed to be first seen in the caves: and thence arises the inquiry into the origin of Indian architecture. Against an opinion that the first masonic architecture of India was founded upon excavated works rather than on buildings of timber; it is urged that the excavations, from the first one that was made by order of *Dasaratha* the grandson of *Asoka*, near *Gaya*, close to the old capital *Rajagriha* in *Bahar*, unto the completion in the twelfth century under *Indra Dymma* of the latest cave at *Ellora*, offer positive imitations of carpentry; while all built structures exhibit a distrust of the two great features of masonry, the immense lintel and the true arch. On the one hand there are the horse-shoe arch with an oggee canopy, executed about 75 A.D. at the cave at *Karli*, which has its nave still ribbed with teak; the 'three-sided', the circular, and the oggee arches, on the topes near *Jelalabad* assigned to the first six centuries of our era; the pointed arch on the rock tope in cave 19 at *Ajunta* ascribed to the fifth century; the trefoiled arch, under an evident copy in stone of an open collar-beam roof of the eighth century at *Mar-tund*: but these are imitative. On the other hand, are the *tee* or relic case with originally one wooden umbrella, but later with such a mark of distinction seven times superposed, which forms the original type of the storied towers of the Buddhists in *Thibet* and *China*, and of the *Jains* in *India*; the railed fence that is built round the tope at *Sanchi* dating between the period of *Asoka's* decrees and the fourth century, but is found carved in every cave; its accompanying gateway resembling the Chinese *pailoo*; the billets on the soffits of the horse-shoe windows; as well as the *Jain* struts of stone: these are as clearly the perpetuation of carpentry as are triglyphs or dentils. It is stated as a general rule by *Fergusson*, *Illustrations of the Rock-cut Temples of India*, fol., London, 1845, that in the earlier temples, or works executed before the sixth century, all those parts which would be constructed of wood in a structural building, are of wood in the caves: but in the more modern excavations, those very portions, such as the external music-gallery, the ribs of the roof, the ornaments of the daghopa, the umbrella of state, etc., are repeated in the rock with a careful preservation of the original forms. The honeysuckle, the bead and reel, and the water leaf, seen upon the *ldts* of *Asoka*, have been considered as indications that the Buddhists borrowed from Occidental, if not from Greek, sources;

but this loan would have affected the styles of the Jains and Brahmins, as descended from that of the Buddhists; and the theory, for many reasons that will presently be adduced, seems hardly tenable. Many details of Indian buildings certainly possess that combination of simplicity in form with richness in pattern which, until LAYARD's discoveries, were held to be essentially Etruscan or Greek: but it is unfair to deny the power in India of producing a style, yet to acknowledge that fertility in Assyria. In a general assertion of the indigenous nature of Indian art, candour requires an admission of the possible influence of such neighbours as those in Bactria brought 521-485 B.C. from Barce in Cyrene, and 485-465 B.C. from Branchidae in Asia Minor; the seven hundred Macedonian settlers in the valley of Bactria; the Greco-Bactrian kingdom 323-125 B.C.; and the captives taken from the Roman and Byzantine armies: as well as a suggestion that to the latter was due part of the character given to architecture in some cases in the Punjab and in Cashmere, and which was perhaps not altogether unconnected with the contemporaneous style of the Sassanian rulers.

Commencing, therefore, with the works of the first excavators of the caves, reference must be made to a short notice of the principal monuments of their worship which will be found *s. v.* БУДДИНА and to the articles there cited. The best of the Buddhist *viharas* or cave-monasteries at Ajunta and Karli, were excavated during the first five centuries of our era. Their ceilings are imitations of a mode of flooring in use at the present time, viz., plastered concrete formed on tiles on 3 ins. square battens, laid 12 ins. apart into the rebated backs of 12 ins. square joists, placed from two to three feet apart, tenoned into the main beams, whose bearing is reduced by brackets. The original form of the post or pillar appears to have the division of a tall square pedestal, square or octagon shaft, and square die for brackets; but the complete design of a railed fence as a basement carrying a pillar with a base and capital, appears upon the gateway of the tope at Sanchi; later the pillar consists of a cubical pedestal, a tall octagon base decorated in the upper part, a shaft with eight or sixteen sides and a rich necking, an octagonal cap, and a square die for the brackets. The round *cushion* form of capital, to which FERGUSON, *Rock-cut Temples*, attaches some importance, appears to belong to no particular period or form of Indian art: it occurs at Ajunta in caves 2, 6, 7, 11, 16, and 19; at Kannari, at Elephanta, at Ellora in the Doomar Lena and the Lanka caves as well as in the Kylas; at Mahavellipore, and in structures south of the river Nerbudda, if not also in the *amla sila* of the northern *vimanas*. An important inference will be drawn, in the concluding portion of this article, from the *Rock-cut Temples*, p. 14, which states, that "the early Buddhists could not get over their singular predilection for the arch, and have employed it as an ornament wherever it could be introduced; and thus, though all the doors are square-headed, scarcely any exist that have not a semicircular or rather horse-shoe ornament above, placed in the manner of a discharging arch in common masonry;" and adds that although the form of the arch is almost universal in all Buddhist caves, it does not, so far as FERGUSON is aware, exist in any Brahmanical one, nor in any structural building in Hindostan prior to the Mahomedan invasion. Externally as well as internally the decorations were, at first, painted in distemper or stucco; and consisted of groups or landscapes on the walls, figures on the pillars or piers, and geometric or flowing ornament on the ceilings: but as the coloured plastering was not found to be permanent, the external work was carved; and this system was extended to the interior, where the colouring was for some time added to the sculpture, but was finally abandoned. As in the subsequent Jain style, obscenity was never tolerated.

A glance through the valuable *Handbook*, pp. 40-63, will supply notices of buildings erected under Buddhist influence

in other countries; it will be seen that the remains of POLLO-NARUA which A.D. 769 succeeded ANURADHAPOORA as the capital of Ceylon, might be taken as a link between the simple magnificence that marked for a thousand years the Buddhist monuments, and the succeeding passion for enrichment which makes the Burmese *kioum* or monastery have a remarkable affinity to the monuments of Buddhism in China. It is to be regretted that the period, to which the pointed arches and vaulted chambers in the Burmese pagodas belong, is not yet determined: the topes or pagodas themselves, at AVA, PEGU, and RANGOON, are unmistakeably cognate, if not to the ruins at BRAMBANAM, at least to those of BOROBUDOR in Java, which are assigned to the fourteenth century. These works are mentioned, because their style, like that of the *kosthakar* in Nepal, is too closely connected with that of India even where the latter was not Buddhist, to be omitted in this place.

When the Buddhists were being persecuted and expelled, the Jains were allowed to propagate a system which is sometimes mentioned as highly moral (and indeed no obscenity occurs in their sculpture), but which FERGUSON says was a mixture of superstition and idolatry that was lower than Buddhism in its most degraded days. They acquired in the eleventh or twelfth century a temporary domination on the continent of India, and now flourish side by side with the Hindoos, chiefly in Guzerat and in Mysore, where a Jain temple is known as a BUSTY. As sufficient matter for a separate notice will be afforded by the works of JAIN ARCHITECTURE, it will be sufficient to state here that the Jains were builders, not excavators, who adapted the Buddhist style to their own purposes; that they have the merit of inventing the coffered construction of stone roofs, as well as the delicate struts from pillars to beams; and that their civil buildings possess nothing to distinguish them from those of the Hindoos.

Some kind of Brahmanism was revived 57 B.C. in Onjein, but was crushed in the western part of India by the Buddhist sovereign Salivahana about 76 or 78 A.D., and its adherents seem to have fled from Guzerat to the south side of Java, where in 413 A.D. they were flourishing. It emerged 318 from obscurity in Saurashtra which, after about a hundred years, again became Buddhist till the beginning of the eighth century. It reappeared in Central Hindostan about 434, arriving from the north at Chillambaram in 471: the struggle in the south of India between it and the Buddhists terminated in the persecution of the latter, who in their turn fled to Java in the middle of the fifth and of the seventh or eighth centuries, probably again when the Sivite worship was restored 800-850 in the Deccan, and finally when the Brahmanical religion reacted upon the north of India during the tenth, eleventh, and twelfth centuries: on this last establishment, the Buddhists superseded the Jain colonies founded in the ninth century. Although this Buddhist religion was so completely extirpated in the present Tanul country, that no monument of it is supposed to exist there south of the river Kistna, the Jains flourished at Conjeeveram (once a principal seat of Buddhism) and in Mysore.

The Brahmins were essentially builders, for although they used caves, perhaps in tenderness to the feelings of their converts from Buddhism, they showed in the same localities their constructive propensities by rock-cut temples, viz., the temple to Vishnu about 800 at Dhumnar, the kylas about 800-850 at Ellora, and the five raths 1250-1300 at Mahavellipore. Their caves at Elephanta (tenth century) and at Mahavellipore (thirteenth century) were dedicated to Siva; as were thirteen of the fourteen (tenth to twelfth century) belonging to them at Ellora, some of which might not have been originally begun by them; they converted the Buddhist cave called Ganesa Gumpha at Cuttack to their own purposes in the tenth century. True Brahmanical caves, like the Doomar

Lena, Ravana-ka-kaie, and Lanka, at Ellora differ from those of the Buddhists in five respects; the absence of arched forms in the caves, the disuse of cells, the equidistant arrangement of pillars which precludes the Buddhist hall, the position of the sanctuary as a detached shrine instead of the Buddhist recess, and the substitution of sculpture for painting.

Although neither the Jains nor the Hindoos introduced anything like a new style of architecture, a line drawn across the map of India from Mangalore to Madras may be said to divide two styles of design in the Brahmanical buildings which are properly the exponents of HINDOO ARCHITECTURE. On the north of this line there is scarcely anything older than the Mahomedan conquest, except in Orissa and Rajpootan. Those illustrated in FERGUSSON, *Pictorial Illustrations of the Ancient Architecture of India*, fol., London, 1847, are one to Vishnu, dating about 657 A.D., at Bobaneswar; another, about 700, at Chandravati; the temple to Siva, of the ninth century, at Barolli; the temple to Juggernath, finished 1198, at Puri; and the ruined Vishnite temple called the black pagoda, about 1241, at Kanaruc. An oggee arch is seen at Barolli. The most remarkable facts in construction which he has noticed are, at Kanaruc, the wrought iron beams 12 ins. square to carry the lintels of the doorway; and those 21 ft. long by 8 ins. square to carry the false roof of the porch, which was formed by stones of similar length, 6 ft. by 2 to 3 ft. in section; the whole has fallen into the porch without damage to the outer roof or the enclosing walls. The temples erected by the Brahmans in Upper India were chiefly dedicated to Vishnu, and in their sculptures no small amount of lasciviousness or rather obscenity occurs; as the worship of Siva extended from the south, many of the dedications were changed.

The two styles of design, just named, appear to be reconciled by such works as the Telec ka Munder (ninth century) at Gwalior, the temple of Kapila Devi (twelfth century) at Bobaneswar, and one of the raths at Mahavellipore.

To the south of the division above indicated belongs the great pagoda of the tenth or eleventh century at Tanjore: FERGUSSON gives illustrations of a porch, 927-77, to the temple of Parvati at Chhillambaram; a gateway, possibly of the eleventh century, at Combaconum; the temple, twelfth century, at Mahavellipore; and a portion of a thirteenth century temple to Siva in the island of Seringham, where the constructed arch shown in his pl. 21 is an addition that was made at the end of the last century. The same accident that occurred at Kanaruc has happened at Mahavellipore, where the fallen false roof allows the timber beams employed to carry another above it to be seen. In Mysore, the temple of the followers of the Vyāsa Veda and of the Sivite Purānas is known as a *gudry*. It is to be observed that on both sides of the line of division the taste exhibited was tolerably uniform both in the nature of the detail and in its decoration: the first epoch of Hindoo architecture has, like its Jain rival, merely the style of its Buddhist predecessor; but it passes into a floriated luxuriance which, at Benares as well as at Madura, bears to the earlier period the same relation that exists between Roman-Greek work, and the styles of Louis XIV and XV.

With respect to a third variety of what must be considered an Indian style, some remarks upon the ancient buildings of the southern flanks of the Himalayas are requisite. The original architecture of the Punjab, Cashmere, or Nepal was Tamul, or else was Arian: either of these origins may be forcibly supported. For the first it may be alleged (as pp. 3 and 4 of FERGUSSON, *Pict. Ill.*), that the southern races form the substratum of the population even in the countries north of the Ganges; that they rendered themselves independent of their Arian conquerors for 300 years and afterwards for 120 years; and moreover (as p. 60) that the inhabitants of Cashmere may be regarded as a fragment of the great aboriginal race of Tamuls, whose connection with the Chola dynasty in the south is traditionally and historically preserved. For the

second it may be said (as in the same work, p. 3) that the Arian race found the aborigines of the south in a nearly savage state, that it was certainly supreme in the north till the time when Rama (B.C. 1800) undertook the conquest of the south of India and Ceylon; and that Asoka, one of the younger branch of the Sanscrit-speaking race, was sovereign of Cashmere as well as of Guzerat, Oujein, Magadha, and Orissa. The same difference will be found in the appreciation of the buildings as they exist, by the chief, if not the only, guide in the study of Indian art: the author of the *Pict. Ill.*, p. 60, states that the temples of Cashmere resemble those of the Chola dynasty in the south more than those of the intervening country; while in his *Handbook* (p. 126) he considers that the remains have a local style differing from anything else in India, pointing certainly to another race and another religion; or (p. 128) to a foreign style mixed up with local constructive peculiarities.

The suggestion, made at the commencement of this article, that Hindoo architecture was aboriginal, tends to reconcile these apparently opposite opinions, and it offers as points of agreement the following views. Unless it borrowed from China the *pai-loo* seen in the gateway at Sanchi, and showed in the Nepalese *kosthakar* two stories of a pagoda, (which is a view that no one has been so hardy as to propound) India could have profited by no other civilization than that of Egypt, of Persia, of Assyria, of Bactria, and of Romanised Greece. A people who placed no trust in the stone lintel can hardly be accused of borrowing anything from Egypt. The occurrence of the bulls Apis and Nandi no more suggests the identity of the mythology than the use of cave temples, open courts, and propylons proves the resemblance of the architecture. Almost every old pillar in Hindostan is the strongest protest that could have been intentionally left to provide against any imputation of having been borrowed from the fluted shafts of Persia; while the Indian chaoiries are as much related to the Egyptian as to the Persian hypostyle halls. The column and the pilaster, large or small, enter into the design of almost every early building, but are later than the arched forms and niches: nobody suggests that these are Assyrian; and the earliest period at which they could be imported would point to a Roman origin, which will not seem a very absurd result to those who agree with BUCHANAN, *Travels through Mysore*, 4to., London, 1807, ii, 249, that no one would suspect that near Coimbatore a tumulus or barrow yielded a hoard of coins of Augustus and Tiberius, amongst various weapons and other articles common to the Romans; or with FERGUSSON, *Handbook*, p. 375, that the palace at Ctesiphon exhibits the parent form of the great portals to the mosques of Eastern Asia. When the Roman influence is denied, there is no course left but to admit either the Bactrian (Greek) origin of all Indian art, or an aboriginal one.

With regard to the Bactrian kingdom, it must be remembered that when Seleucus returned 312-302 B.C. from India, where Megasthenes, and later Daimachus, remained as ambassador at Rajmahal or more probably at Boglipore, he included in his kingdom not only Parthia but Bactria, which, with Sogdiana, had submitted as Persian territory to Alexander. Parthia, or the country between the Euphrates and India, revolted under the Arsacide 256 B.C.; Seleucus II died there a prisoner about 226 B.C.; it defeated Crassus 56 B.C.; was allied to Pompey; was chastised by Ventidius; in great part was subdued by Trajan, Antoninus, and Caracalla 117-217 A.D.; and expelled the Arsacide 226 A.D. for the Sassanian dynasty, which 441 divided Armenia with the Byzantine power and, it is urged with some diffidence, could supply prisoners enough to translate classic art into MARTIND, MULLOTE, PAYECH, and PANDRETHAN. At the same time with the Parthian revolt, there was a Bactrian secession; the third monarch of the new dynasty was Euthydemus 220-196, whose son Demetrius and

successor Menander 196-181 seem to have conjointly conquered India; Demetrius appears to have obtained the country on both sides of the Ganges, while Menander's coins exhibit a Greek obverse with a Bactrian-Pali reverse; Eucratides of Bactria conquered Demetrius about 150 B.C.; and the kingdom was destroyed 125 A.C. by the Scythians or Sacæ, whose power in India was extinguished 56 B.C. by Vicramaditya the Brahmanical king of Upper India, who was killed in battle by Salivahana the Buddhist raja of the Deccan: the Sacæ appear, however, to have held an independent position between Cabul and Jelalabad for a long period, as the years 75-125 A.D. are mentioned as the time of their great power, though they afterwards were subject to the Sassanian princes. Such were the neighbours of Asoka and his successors: and it will be seen that the Bactrian princes within half a century of his time appear to have been masters of the territory that he had received from his grandfather. Although the numerous coins of 'the great Azes, king of kings', are referred by PRINSEP to the age of Gallienus 260-8 A.D. it may be conjectured that they really are four centuries earlier, and not much later than Asoka, their low type being due to native workmanship. The Bactrian coins 220-146 B.C. are sufficiently well executed to show that they are as truly Greek and not Bactrian, as the decorations of Asoka's lîts are Greek and not Sanscrit or Tamul. No architectural work of these Parthian and Bactrian neighbours of Asoka can be mentioned, unless it be the tope; and, from the positive evidences of Roman coins, it does not seem that any such structure dates before our own era, when the Indo-Scythic Sacæ, and not the Bactrians, occupied the western confines of Upper India. A palace in the time of Asoka and his immediate successors probably had framed roofs to three or more recessed stories of brick walls with verandahs, balconies, and porticoes of stone shafts carrying timber entablatures, probably covered with tiles: such are the houses indicated by the sculptures on the gateways at Sanchi. The Indian builders were a people that had so much practice in the use of timber as to be unable to dispense with it at first even in the caves. Their use of brick did not extend to the construction of a true arch so far as to turn a dome, a barrel vault, or a discharging arch. They had such an extraordinary predilection for imitating the arch, that the horse-shoe is seen more than five centuries before the Hegira, and other forms as long before a gothic architect existed. The trefoil and the trefoiled horse-shoe occur from the eighth to the tenth century in Cashmere which was Buddhist in 630 A.D.

These points destroy the idea of a Bactrian (Greek) origin of Indian art, and nothing is left but the admission of an aboriginal style that was either Sanscrit or Tamul. As far as regards the detail, which alone can guide in this decision, there is some slight difference in the forms, but none in the taste, exhibited by the north and south in contemporaneous works; those countries have seen a steady change from simplicity to floridity without a break (with one remarkable exception) sufficient to justify any assertion of a sudden change of fashion; the Perumal pagoda at Madura and the Vishvesher temple at Benares are legitimate descendants of the kylas at Ellora, which is itself Tamul and the direct successor of the earliest caves that exhibit art of any sort. Testimony to the transition is borne by the *Handbook*, p. 28, which, speaking of caves 26 and 19 at Ajunta, says that the first named "was excavated at too late a period to obtain much purity of style, and all its details are coarse and clumsy when compared with the last; while its sculptural arrangements show such a degenerate tendency towards modern Hinduism, as to denote that the style was at its last gasp when this cave was commenced"; the same work, p. 29, speaking of the cave at Kannari, ascribed to the ninth or tenth century, considers it to have been executed at a time when the original art had so greatly decayed that copying had taken the place of design, and to have been merely an attempt to reproduce the cave at Karli, which is

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supposed to belong to the first century. The remarkable exception decides the point; "neither the Jains nor the Hindoos introduced anything like a new style of architecture", *Handbook*, p. 65; if the Tamul priests retained the art but rejected the arches, then the art was Tamul and the arches were Arian and Roman. Part of this conclusion seems fortified by the *Handbook*, p. 108, stating that the Arian race, which prevailed in the northern part of India from a very early period, was not in the habit of building temples or durable edifices of any kind; and p. 102, that the Tamul race introduced the Sivite worship into Upper India. Having thus opened one way of arriving at the decision that there was no independent Arian style (the termination of the Surkh minar in Cabul might be restored from a sketch made at Ellora), it leads to the inevitable inference that the Nepalese *kosthakar* and the Tamul *pagoda* of the present day are the offspring of an art that, ages previously, was indigenous in both countries and in the territory between them: an art (as FERGUSON, *Handbook*, p. 131, observes) so completely alone, so entirely separate from the other forms of architecture of the world, that it cannot well be compared with any of them, without the risk of conveying false and erroneous impressions, more likely to mislead than to instruct. It would be desirable, in a more extended consideration of the Arian conquest of the Tamul race, to refer to two papers by MUELLER in BUNSEN, *Christianity and Mankind*, 8vo., London, 1854, iii, 128 and 263, but especially 432.

The works already noticed as having been executed before the end of the thirteenth century, illustrate the progress of native art from the first Mahomedan invasion 997 A.D. and final conquest 1193 of Northern India. The Afghan dynasty, which 1289-1316 subdued the Deccan and 1398 was crushed by Timur, appears to have been too bigoted to allow the Hindoos to erect temples of any pretension; so that examples of further progress are only to be found in the districts remote from their immediate dominion, as buildings erected by some of the native princes that obtained power in the general confusion which existed 1326-1526. Some of the edifices (not Hindoo) erected during the prevalence of the Arabian faith will be noticed s. v. MAHOMEDAN ARCHITECTURE.

With the commencement 1526 of the Moghul dynasty, the Hindoos obtained greater tolerance, and during the reign of Akbar 1556-1605, their style found its way into his buildings; their own structures display a large amount of Saracenic forms which were permanent in their influence upon the general style, and so far impressed upon the ecclesiastical portion of it as to stamp those edifices with the modern temple form, much as is seen in the temple to Vishvesher built about 1750 at Benares. Among the contributions to this alteration were the domes and the true arches. The former are seen in the *chultry* or cenotaph, itself one of a class of buildings entirely unknown to the mediæval Hindoos, which though adopting arcaded forms never introduces the true arch, but cuts each half of it out of single stones 4 or 5 ins. thick as facings to rubble work about 9 ins. thick. The latter are not seen in any building in India prior to the Mahomedan invasion, nor then in almost any Hindoo building down to the present time, except in some temples erected under Akbar by his minister Maun Sing at Bindrabun and Jeypore. Mahomedans from Delhi are said to have constructed after 1625 the hall of the palace at Madura; and at that town the Perumal pagoda 1623-45 exhibits all the more interesting peculiarities of the modern Hindoo style. The trellis-work in stone is another contribution. The Moghul empire may be assumed to have virtually expired 1760; but a general dissolution of authority 1713-20 saw the establishment of several petty dynasties, each of which had its country palaces and hunting-seats of more or less pretension, and enriched its capital with *boulees* or wells, *bunds* or dams, *ghauts* or landing-places, and residences which, whether private or princely, owe most of their effect to arcades

and pavilions with boldly corbelled cornices and balconies. For specimens of such late work in Hindostan as exist at BENARES and BOONDEE in the north, at COMBACONUM, CONJEVERAM, MADURA, RAMISSEKAM, SERINGHAM, TINNEVELLY, and TIRUVALUR in the south, reference may be made to the illustrations mentioned in the articles describing those places: the similarity between the usual southern section of cornice and the ornament that may be called an elephant's trunk is remarkable. But the great feature of this period is the destruction of the Hindoo temples and sculpture about 1660 by order of Aurungzeb.

If the Mahomedan influence sometimes appears strongly in civil edifices, an attempt at copying European art has been exhibited in ecclesiastical structures. On the western coast, the Nestorians seem to have had less influence than north of the Himalayas: and the five churches at Goa designed in the sixteenth century by the Portuguese priests, although important buildings, being from 300 to 400 ft. in length, having naves 40 to 50 ft. in width, with aisles and cloisters, are naturally impure in detail being executed in plaster upon laterite. Whatever was done by them, by the Dutch, the Danes, or the French, was of course intended to be in an Italian style. The English settlers held a similar course until the commencement of the present century, and the columns of that style have become so naturalised as to be adopted by the natives to the best of their power, in preference to the old local style. At first the English influence was less prevalent in Bengal than in the Carnatic; so that among the earliest structures exhibiting the native comprehension of the Italian dicta, is a pagoda at Tanjore which is ornamented (as the builder supposed), with Ionic and Corinthian columns, balusters and details of the very worst class, painted with extreme vulgarity. Afterwards the Greek taste prevalent in England came into action, and about 1825-30 the Gothic fashion was imported. Amongst the examples of the Italian period may be named the palace of the French general Martin at Lucknow about 1780-90, in imitation of which the other domestic structures in that city have been erected, although the mosques, imambarrahs, tombs, and other edifices of that class have preserved the appearance of debased Mahomedan work; and the government house at Calcutta. In the Greek style were erected, the palace at Moorshebad (illustrated in the CIVIL ENGINEER *Journal*, 1842, v, 151, 205); the town hall; the Metcalfe hall; the Martinière; the colleges; and the mint at Calcutta; and the town hall at Bombay. As specimens of the Gothic which has been exhibited to the natives may be named the cathedral at Calcutta; the Fort church in the same city, which is said by FERGUSSON, *Handbook*, ii, 412-22, to have been meant for a repetition of the chapel in York-place, Edinburgh, itself a copy of the church of S. Mary at Beverley; and the college at Benares.

Writing of the southern Hindoo, FERGUSSON, *Handbook*, 130, states, "Hindoo architecture continues almost unchanged to the present day, except that the Mahometan influence is sometimes strong in civil buildings; and cases occur in which a strange mania for copying debased European art has crept into the sanctums of their temples." But as to the northern he says, p. 131, "that the introduction of Saracenic forms gave it a grace and freedom which it had not known before; and though its details became less pure, its forms were improved by the addition: it is now sinking under our influence, till it is little better than a caricature of its former self." Although this appears to contradict a preceding statement, the truth seems to be that, from the date of the commencement of the Taj-mahal at Agra, both in south and north, European influence has been at work; and this, once introduced, soon spreads. An interesting account of the state of architecture in Bengal and of a native architect, is given by MARTIN, *History, etc., of Eastern India*, 8vo., London, 1838, ii, 922, to which should be added the remarks in iii, pref. xiii.

Besides the publications already named in the preceding remarks, the chief works illustrating this subject are:—DANIELL, *Oriental Scenery* (5 series), 4to., London, 1795-1815; *Antiquities of India*, fol., London, 1799; *Views in Hindostan*, fol., London, 1805; GRINDIAY, *Scenery, etc., of India*, fol., London, 1826; TON, *Annals of Rajasthan*, 4to., London, 1829; and *Travels in Western India*, 4to., London, 1839; RAM RAZ, *Essay on the Arch. of the Hindus*, 4to., London, 1834; KITTOE, *Illustrations*, fol., Calcutta, 1838; WILSON, *Ariana Antiqua*, 4to., London, 1841; CUNNINGHAM, *The Bhilsa Topes*, 8vo., London, 1854; and PRINSEP, *Essays on Indian Antiquities, Tables of History, etc.*, 8vo., Lond., 1858. The papers contributed to various societies, such as the ROYAL ASIATIC SOCIETY, *Transactions*, 4to., London, 1827, etc.; and *Journal*, 8vo., Lond., 1834, etc.; ASIATIC SOCIETY OF BENGAL, *Asiatic Researches*, 4to., Calcutta, 1785, etc., and *Journal*, 8vo., Calcutta, first series, 1832, second series, 1839, etc.; LITERARY SOCIETY OF BOMBAY, *Transactions*, 4to., London, 1819, etc.; and ROYAL INSTITUTE OF BRITISH ARCHITECTS, *Transactions*, 4to., London, 1861-2, p. 168, paper by SIMPSON, *On the Architecture of India*.

INDIAN BLUE, see INDIGO.

INDIAN INK or CHINA INK. This black seems to have been unknown to the Romans, for VITRUVIUS, vii, 10, appears ignorant that he very nearly gives the same recipe as the Orientals for its manufacture, for when saying that carbonized dregs of wine will make a good black, he adds that "qui magis ex meliore vino parabitur, non modo atramenti sed etiam indicis colorem dabit imitari," (here *indicum* means a blue): the same substitute is noticed by PLINY, *H. N.*, xxxv, 23. The Chinese received it 630 B.C. in tribute from the Coreans, and did not themselves arrive at perfection in the manufacture until 900 A.D. according to DU HALDE, *Descr. de la Chine*, fol. Paris, 1735, ii, 246, who observes that it consists "d'un noir de fumée qu'on avoit recueilli de vieux pins brûlés, et où l'on avoit incorporé de la colle de corne de cerf." When mixed in water with burnt sienna, the two colours seem to form a fine insoluble dirt not to be used; and a tint of Indian ink assumes a pearly grey when a wash of yellow ochre has been passed over it. This pigment is principally brought from China in oblong cakes, prepared for painting in water colours, etc., and is scented with (as is presumed) patchouli.

INDIAN LAKE, see LAC LAKE.

INDIAN OAK, see QUERCUS.

INDIAN RED also called PERSIAN RED. A pigment brought from Bengal, being a very rich iron ore or peroxide of iron. It is of an anomalous red colour, of a purple russet hue, of a good body, and valued when fine for the pureness and lakey tones of its tints. Its chemical tendency is to deepen; nevertheless it is very permanent, as neither light, impure air, mixture with other pigments, time, nor fire, effect any sensible change in it. FIELD, *Colouring*, 12mo., London, 1850.

INDIAN RUBBER, see CAOUTCHOUC.

INDIAN WOOD. Lists of the Indian trees producing timber and ornamental woods, are given in SOCIETY OF ARTS *Journal*, xlviii, p. 441; and INTERNATIONAL EXHIBITION 1851, *Jurors' Reports*, 8vo., London, 1851.

INDIAN YELLOW. A pigment long employed in India, and only lately introduced into painting in European countries. It is imported in the form of balls, of a fetid odour, and appears to be an urio-phosphate of lime, of a beautiful pure yellow colour. It resists the sun's rays with singular power in water colour painting, yet in ordinary light and air, or even in a book or portfolio, its beauty is not lasting. In oil it is also exceedingly fugitive, both alone and in tint; foul air does not injure it. FIELD, *Colouring*, 12mo., London, 1850.

INDIGO. (It. *indaco*; Sp. and Turkish *anil*; Fr. *indigo*; Ger. *indig*; Hindoo *gali, nil*). Colouring matter, which is peculiar to the tropical indigo-bearing plants, and to the *isatis tinctoria* (the Latin *lutum*; Fr. *pastil*; Eng. *woad*). It is

chemically a glucoside, obtained by steeping the plants until the sugar is separated and the remainder of the base dissolved: this remainder becomes blue by absorbing oxygen during the process of beating the solution; and, being then rendered insoluble, it is precipitated, collected and dried into cakes or cubes: these supply the indigo of commerce, which contains, besides some earthy matter, indigo-blue, indigo-red, indigo-brown, and a glutinous matter. If a watery solution of the glucoside be boiled for some time, it yields indigo-red, without a trace of blue; while, if boiled with alkalies, the result is only a brown resinous matter. The products of the glucoside are considered by BANCROFT, *Experimental Researches concerning the Philosophy of Permanent Colours*, 8vo. Lond. 1794, i, pp. 97-138, who describes, especially p. 144 and p. 451, an indigo-green.

INDIGO BLUE. The oxide of indigogene. Its preparation requires notice, because the reasons for its faults as a pigment will therein appear. When common **INDIGO** is treated with dilute acids, alkalies, or alcohol, the result is indigotine or indigo-blue nearly pure, with the remarkable property of deoxidation by bodies having a powerful affinity for oxygen, such as the protoxide of iron, the solution of sulphuret of arsenic in potash, the hydro-sulphates, etc. Pure indigo may be procured by sublimation, but the process may terminate in decomposition. Another method is to use the process that is followed by dyers, viz., to reduce the cubes into powder, to which are added lime and a solution of proto-sulphate of iron; the lime, decomposing the sulphate, precipitates protoxide of iron; and this takes the oxygen from the indigo, which becomes colourless indigogene (*Fr. indigo blanche*) soluble in water by the action of the excess of lime. When the solution above described is agitated in contact with atmospheric air, the white indigo regains with oxygen its colour; is precipitated; and, after being washed with a little muriatic acid, is considered to be pure. This indigo is not soluble in cold water, or in alcohol, potash, or dilute sulphuric acid, but it is slightly soluble in boiling water. Strong nitric acid decomposes it: but it is soluble without decomposition in concentrated sulphuric acid, which gives a most intense colour, the base, with water, of *Saxon blue*.

Indigo blue is supposed to have been employed by the Egyptians, who could obtain it then, as now, from the native *tephrosia apollinea*. VITRUVIUS, vii, 14, notices a substitute for it; and PLINY, *N. H.*, xxxv, p. 12, mentions it as different from *purpurissimum*, besides specifying, p. 27, a method by which it was adulterated. In mediæval times it was known as *indigum*, as early as 1193. BANCROFT, i, 138, states that the earliest notice of it in England is under the names 'Anle alias Blue Inde', in the act 23 Elizabeth. PHILANDER, who writes *indico*, notices that the Venetians used *endego*.

Although he allows that indigo has great body, and glazes and works well both in water and in oil, FRIEDL, *Chromotography*, 4to, London, 1835, pp. 112-3, admits that its relative permanence as a dye has obtained for it as a pigment a false character for durability, in which quality he considers it very inferior to Prussian blue. He notices that it is injured by impure air; is fugitive in a tint made with white lead, and, when not freed by washing from the acid and saline matters employed in its preparation, is apt to penetrate the paper upon which it is applied. But he considers *intense blue* (or refined indigo) more durable, as well as more powerful, transparent, and deep. He adds that these, like some other blues, are said to have the power of pushing Indian ink from paper; but that, as this effect is chemical, it can hardly be an attribute of mere colour. Certainly indigo does not work well with some other colours; it bleaches when touched by chlorine, orpiment, and potash, as well as by the iron and other substances above mentioned: this may account for the disappearance of the sky, etc., from water-colour drawings upon some modern papers; indeed, even upon old papers not chemically whitened, indigo mixed with some reds and yellows will not

last. The question, propounded in the *BUILDER Journal*, 1861, xix, 670, of preventing the lime of new plastering from absorbing (as it is there called) the indigo of colouring, is only answered, p. 744, by Reynolds's praise of his new metallic plaster mortar used at the church of S. Luke, Sheffield, wherein almost directly the plastering was done, it was coloured indigo, and "looked perfectly well a few months afterwards."

INDRAPUT (Sanskrit, *Indraprist'ha*), or Old Delhi, in India, see DELHI.

INDURATION. The process by which a substance is made harder and therefore more capable of resisting the effects of the atmosphere or other external agents. This object is aimed at in the various processes of tanning, converting into oil cloth, felting, painting, the induration of wood or stone by immersion, the application of some hardening material by a chemical process, etc. In some cases induration is produced by exposing the substance to the effects of fire, as in hardening of wood by charring; or by a chemical change produced in its constituent parts, as in the artificial hydraulic limes. The various processes employed for the induration of building materials are described *s. v.* **HARDENING TIMBER**; **PRESERVATION OF STONE**, etc.

G. R. B.

Geology points out that time and pressure are powerful indurators, converting slime and mud into a stone hard enough to be used for building.

S. S.

INDUSTRIAL SCHOOL. An establishment, erected by the guardians of a parish, for the industrial education of pauper children. A building of this character situate about three miles from Oxford, was designed by E. G. Bruton, to accommodate 200 children; it is of the **I** plan; the offices of administration and dining-hall dividing the sexes, and a detached infirmary being placed behind. Each sex has school and class rooms; the girls are taught house and laundry work, and baking; for each operation suitable buildings are provided; they likewise assist in the kitchen. The boys learn tailoring, shoemaking and mending, with farm-work on about ten acres of ground, besides pumping all the water required on the establishment. The plan is given in the *CIVIL ENGINEER*, etc., *Journal*, 1855, xviii, p. 2; and that of the proposed Middlesex industrial schools, at Feltham, with a view, is given in the *BUILDER Journal*, xv, 26. The Industrial School and Reformatory acts were passed 17 and 18 Vict., c. 74 and 86.

E. G. B.

INDUSTRY (**PALACE OF**), see **EXHIBITION BUILDING**.

INERTIA. The term given to that condition of bodies which renders them incapable of changing their state of motion or repose, unless influenced by some external agent. In mechanics it is called 'vis inertia.' *Vis inertiae* is opposed to *vis viva* or *living force*, and *accelerating force*. BUCHANAN, *Mill Work*, 8vo., London, 1841, 292-3.

G. R. B.

INFANT SCHOOL, see **SCHOOL**.

INFIRMARY. This word appears to have two opposite meanings. In one it designates a place for aged, blind, or impotent persons; LENOIR, *Archit. Monast.*, 4to., Paris, 1856, ii, 389, considers such was the "hospice des religieux *sympectæ*," which would correspond to the late Gr. *νεροκομείον* or *νεροτροκομείον*, and now represented by asylums, hospitals for the alleviation of incurable diseases, etc. That author correctly notices the other sense in which the monastic *infirmaria* or *infirmatorium* or *infirmarium* was used, viz., as a place for the cure of wounded or diseased members of the community, corresponding to the Lat. *valetudinarium* and late Gr. *νοσοδοχείον* or *νοσοκομείον*, now represented by infirmaries or hospitals for the reception of temporary patients. **HOSPICE**; **HOSPITAL**.

The triple employment of the monastic infirmary is shown by DUCANGE, *Gloss.*, *s. v.* *infirmaria*, from a manuscript book of the order of S. Victor; it was shared by those who were convalescent, those who were confined to their beds, and the aged, the blind, the infirm, etc. This mixture of characters is supposed by LENOIR to be shown in the celebrated plan of the abbey at S. Gall (given in the *ARCHÆOLOGICAL JOURNAL*, 1848, v,

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pp. 109, 110), in which three different places for the sick are marked—one is a chamber in the house of the novices; another is a chamber in the doctor's house for the grievously sick, 'valdè infirmi,' whom LENOIR supposes to have been outdoor patients; and the third is a distinct portion of the monastery between the two just mentioned. It consists of a summer parlour and a refectory, opposite to a dormitory and a winter parlour, these being separated by the master's room and a separate chamber, again for the 'valdè infirmi,' and looking into a cloister which has one side against the chapel of the infirmary. The Benedictine infirmary for the sick took naturally the shape of a dormitory with a cloister, a chapel, and the requisite appendages for servants; and the Cistercians never constructed their infirmaries otherwise, according to LENOIR, who cites as an example, the great hall called the *salle des morts* of the abbey at Ourscamp near Noyon, illustrated in VIOLET LE DUC, *Dict.*, s. v. *Hôtel-Dieu*, p. 105, and gives the plan of the seven-roomed infirmary of the Jacobins in the rue des Grès at Paris. It is said that the remains, or the site, of such portions are visible in England at S. Albans, Binham, Bridlington, Castle Acre, Durham, Hulme, Rievaulx, Shrewsbury, and Worcester: and that at Canterbury, Gloucester, and Westminster, the infirmary was placed to the east of a small cloister and provided with a chapel and a hall; so at Ely the remains of arches and a chapel near the south side of the cathedral have been supposed part of the infirmary erected soon after 1174: in like manner at Peterborough, the ruins south of the cloister are called the infirmary, with the chapel of S. Laurence, the refectory, and the lesser cloisters, dating 1248-74. It appears from LENOIR that some monasteries had convalescent hospitals, with infirmaries in the country; thus the abbey at S. Denis had one called the maison de Seine; and Gérard de Moret, abbot of S. Germain des Prés in the thirteenth century, built one at Valboitron since called from him Vaugirard. Other monasteries, like that of S. Antoine in Dauphiné, attracted so many lay visitors by the possession of curative waters, exhibited with relics to patients, that it became necessary (as in ancient times at Cos, EPIDAUROS, and Tricca) to build lay infirmaries, which were sometimes double to effect separation of the sexes, and were the prototypes of the establishments now called, indiscriminately, hospitals or infirmaries.

"The chapel of S. Catherine at Westminster abbey, a work of the fourteenth century, was the chapel of the infirmary; it occupies a position not dissimilar to corresponding chapels at Canterbury, Ely, and Peterborough. The usual plan of the infirmary in a monastery was very similar to that of a church; with this difference, that the quasi-nave was very long and divided, at about one-third of its length from the east, by a cross wall perforated by a central doorway. The western portion formed the infirmary proper; the eastern portion being the nave of the chapel with a chancel extending still further eastward. This arrangement allowed the sick monks to hear the service as they lay in their beds, while the convalescent could readily betake themselves to the chapel: and it may still further be traced at the three places above named. There is a similar building still in use (though unconnected with the cathedral) at Chichester; also, with more or less variation, at Bruges, Lübeck, and probably at other places. It is possible that the Westminster infirmary may originally have been of the same description; the chapel, of which the remains are sufficient to show its plan, agrees with it precisely; but the infirmary proper is gone, and it may have been destroyed when the 'small cloister' was built. If the 'small cloister' be proved to be of early date, the infirmary may have surrounded it. An old hall of the date of abbot Litlington (1362-86), who is known to have built a new house for the infirmarier, abuts upon the south side of the chapel, into which it has a doorway. It was probably used by the convalescent patients. The garden, now called the 'college garden', was originally the infirmary garden.

"The chapel consisted of a nave and aisles five bays long, with a chancel the length of which has not been ascertained. It is of very good late Norman work, and in its details much resembles that at Ely, even to the setting of the octagonal columns angle foremost; but it is less rich. The west doorway is of abbot Litlington's time. The pier of the chancel arch was discovered in 1858, while alterations were being made in an adjoining building, but it has since been destroyed. The hall above mentioned, had a gallery extending over an aisle of the chapel with a fireplace in it. This hall and fireplace are now exposed to view, but the gallery was not saved: parts of the chapel are also now visible"; SCOTT, *Gleanings*, etc., in paper read at the Royal Inst. of Brit. Architects, Dec. 1859.

In civil life, the infirmary is the proper, and the usual, name for the place appropriated to the sick in a large establishment; such as a palace, an asylum, a prison, or a school: thus Greenwich hospital, as a permanent refuge or asylum, is a pure hospital, and contains within its walls an infirmary. It also seems to be the proper name for many large unattached structures for the temporary care of the maimed and diseased. An interesting passage in *NOTES AND QUERIES Journal*, 1865, 3rd ser., vii, 177, mentions the manner in which the infirmary in S. Margaret's (now called Westminster hospital) was conceived 1715-19, and afterwards, 1733, another (called now S. George's hospital); besides one at Winchester, and another 1738 at BATH: another at Dublin, founded 1728, retains its original title of 'charitable infirmary'; and it is remarkable that one of the benevolent promoters of these establishments uses, in the passage cited, the words 'hospital' and 'infirmary' as synonyms. More recent writers have used 'hospital' for an endowed infirmary like GUY'S 1720, and 'infirmary' for an establishment supported by subscriptions, like the Westminster 1719 and the London 1740, which called themselves infirmaries so late at least as 1761; but S. George's had then taken the name of 'hospital': and the Middlesex 1745 was an hospital in 1761. This distinction seems justified by the wording of a resolution passed at a meeting 1719 of the founders of the Westminster hospital, which declares it to be "an infirmary, or place of entertainment, for such poor sick persons in the parish of S. Margaret's Westminster, or others who shall be recommended by any of the subscribers or benefactors with the approbation and consent of the major part of the trustees then present." MAITLAND, *Hist. of London*, fol., London, 1739, p. 671.

INFLEXION. A point of contrary flexure is sometimes called a point of inflexion. FLEXURE. 14.

INFUSORIAL EARTH, see FLOATING BRICK.

INGA KYLOCARPA, the *jamboo*. A tree of Southern India, growing to a large size, and much valued for house building on account of its strength and toughness.

INGELHEIM (HANS VOX), see HANS (MEISTER).

INGELRAMME, see ENGUERRAND.

INGENIARIUS and INGENIATOR. These late Latin words are derived, according to DUCANGE, *Gloss.*, s. v. *ingeniator* and *ingenium*, from the latter term for a machine or engine, especially one used in war. He cites various forms of these words as meaning the person who designed, constructed, or worked such a machine. Amongst his quotations are, 1206 *le engigneur*; *le enguignierres qui ont l'engin basti*; 1223-6 *l'engignor*, Amauri, *sire des engignours et commandere des minours*; 1334 *the magister ingeniorum*; and 1336 *the engeniator*. The old Fr. *engegnérie* for the science of fortification, and *engigneurs* for the corps which practises it, have been superseded by the term *génie militaire*: the constructors of fortifications appear to have been known in France as *architectes*, at least until the use of artillery and the employment of Italians. Indeed in Germany at the present time *bau-meister*, with the necessary qualifying prefix, answers to each French term for a practitioner in any branch of engineering, civil, military, or naval.

The combination of skill in the attack and defence of places with art and science in constructing them, seems to have existed in Italy until a late period. Not to speak of Vitruvius or Anthemius, of Arnolfo and of Andrea Pisano who built the walls and towers of Florence, of Giovanni da Pisa who designed the Castel Nuovo at Naples, mention may be made of the architects of the cathedral at Milan, as the words *ingegnerius* and *inzinerius* are applied 1388 in the contemporaneous records to Marco da Campione and Simone da Orsenigo, and to others as late as 1401 according to GIULINI, *Mémoire*, 4to, Milan, 1771, xi, 437-59. It may be worth while to notice as engineers, Rosellini and Fioravante, Giuliano and Antonio (Giamberti) di Sangallo, Leonardo da Vinci engaged upon canal navigation, Antonio (Picconi) da Sangallo and Fra Giocondo, B. Genga and F. Manlio, the fortifications of San Miniato by Michael Angelo, of Caprarola by Vignola, of Lucca by Muzio Oddi, before mention is made of the system of modern fortification invented before 1529 by Michele Sanmicheli, a worthy successor to these architects.

When the ruler of Cambay was preparing 1540-6 to attack the Portuguese, he sent to Constantinople for five "architecti etiam et machinatores egregii," according to MAFFEIUS, *Hist. Indicarum*, fol., Florence, 1588, p. 254, and these terms are translated "eccellenti architettori e ingegneri" by SERDONATI, *Istorie*, 4to., Florence, 1589, p. 503. The inevitable result of Sanmicheli's unpublished inventions was a number of architect-engineers, whose employment would not allow them a domicile, engaged in various parts of France, Spain, Italy, and Germany. The inhabitants of Noyon were ordered 1553 to put in order their ramparts and ditches, "selon le dessein qu'en bailleroit par escript le Sieur Baptiste ayant charge de la fortification des villes de l'île de France;" and they contracted with two Parisian masons to do the work according to the directions given by "Baptiste ou autres ingegneres du roy;" a certificate, dated 10 May 1554 by this Baptiste, who calls himself Jo Batta Porcell, is given in DE LA FONS-MÉLUCOCCO, *Les Artistes*, 8vo., Bèthune, 1848, who, 173-5, supplies these notices of Noyon: that city paid two golden crowns, value four livres and four sous, to the 'ingenier' or 'engenaire' who had surveyed the condition of the ramparts 1563; and six crowns to "maitre Jehan Payot ingenieur suyvnt mousseigneur le duc de Mayenne pour avoir pourtraict le plan de ceste ville," 1589.

The combination of the words 'architect' and 'engineer' appears in the case of Louis de Foix who 1584 is called 'architecte et ingénieur du roy' in DE LURBE, *Chronique*, 4to., Bordeaux, 1594. But it is carefully noticed by BLONDEL, *Arch. Franç.*, fol., Paris, 1752, iv, 87, that Clement Metezeau was 1628 an "ingenieur car on appelloit ainsi dans les siècles précédens, les architectes des rois de France;" wherefore the distinction between a civil architect and a military architect, or as would now be said, between an architect or an engineer, had already been fully recognised. Amongst other drawings by the great French architect, the British Museum *Harl. MS.*, 4421, possesses "les plans, profils, et devis de l'estat des fortresses maritimes de Provence, par F. Blondel, maréchal de bataille aux armées du roy et ingénieur ordinaire de la marine, 1651;" and in the same establishment, *Bib. Reg.*, lxx, 70, is a coloured "carte particulière de la comté de Rossillon et de la vallée de Conflens par Cavalier ing. du roy, 1635." About 1700 Philippe De la Force was *ingénieur du roi* and architect to the duke of Orleans: but the registers of the Academy of Architecture, chiefly founded by Marshal Blondel, only contain three names to which the designation of engineer is appended: Hupeau 1757-63, and Peronnet 1758-94, are qualified as ingénieurs des ponts et chaussées, and Regemontes 1765-74 as ingénieur simply. It must not be forgotten that the career of the "corps des ponts et chaussées" for the first forty years 1750-91 was directed by an architecte-premier-ingénieur: for although Vauban, commissaire-général des fortifications 1679-1707,

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founded 1668 the "corps des ingénieurs civils et militaires", the civil and military branches were separated 1750. In 1765 the title of *ingénieur* was given by royal command to the leading master carpenters in the dockyards of France, with a corps of three schools, Brest, Toulon and Rochefort, at each a chief engineer, two or three engineers, four or six sub-engineers, and some pupils. Changed in 1774, 1778, 1789, and 1796, the administration in 1838 consisted of an inspector-general, five directors, twenty-four engineers, and thirty sub-engineers.

The term *ingeniero* as applied to Estacio and Malpaso by LLAGUNO, *Noticias*, 4to., Madrid, 1829, is perhaps given on his own authority; but he furnishes documents that show the use and the meaning of the word in Spain, from as early as 1539. He mentions the treatise *Teórica y práctica de fortificación por el capitano C. de Rojas ingeniero del rey* 1598, when it would seem that this word was equivalent to the term architect of fortifications, moles, harbours, canals, and all hydraulic work, except fountains, which appear to have been retained by the architect, thus 1565 G. Gutierrez is commended as *arquitecto y fontanero*, and 1594 G. de la Barcena is named as *arquitecto y fontanero-mayor* at Valladolid. One of the most remarkable places in which the word occurs, is in a minute of 4 August 1607, given by LLAGUNO, iii, 293.

Amongst the records in England, the use of the term *ingeniator* has been found as early as 1160 at Berkhamstead. About 1170 Richard de Wolveston is noticed as "Ricardi ingeniatoris de terra sua de Wolveston," and as "vir artificiosus fuisset opere, et prudens architectus in omni structurâ artis forissec;" he was employed by bishop Hugh Pudsey (1153-94) in works at Norham castle, and was probably succeeded by William ingeniator as recorded in 1197. "Elye ingeniator x marcas ad reparacionem domorum regis apud Westmonasterium, 1198-9 is noticed by DALLAWAY, in WALPOLE, *Anecdotes*, 8vo., London, 1762, as being certainly an architect!; Mauricius ingeniator was 1186 at Dover Castle; Forcinus ingeniator 1204 at Colchester castle; Bayard ingeniator 1205-6 at Nottingham castle; Peter ingeniator had ninepence a day in 1206 or 1216; Albert and Gaufridus were ingeniators at the Tower of London temp. (1252? 37) Henry III or Richard I. Master Richard the engineer, and Henry de Oxford carpenter, received £100 for carpenter's work in the hall at Conway 1285-6, 14 Edward I. Fratri Roberto de Ulmo magistro ingeniatori retento ad vadia regis—ix den. per diem, etc., occurs in 1299: Thomas de Hokyntone or Hoghtone *ingeniaro* (probably the same as Thomas le charpentier) was concerned with the tomb to queen Eleanor in Westminster abbey, cir. 1300. In king Henry VIII's reign, Germans and Italians, "expert men in the skill of fortifying," 1540-44, were employed; and in 1653, in the contract for building the church at Ayr in Scotland, certain parts were to be built "according to the rule set down by the *ingineer*." INGYNE. Most of these earlier references herein noticed were set forth by HARTSHORNE, *Military Architecture of Great Britain*, paper read at Royal Institute of British Architects, 1850, as architects.

INGRAVE. A term frequently occurring in old documents, and signifying to carve, cut, or sculpture. 19.

INGRAYLED WORK, see ENGRAILED.

INGYNE. A term formerly used in the north of England and in Scotland probably to express forms of 'ingenious' and 'ingenuity,' as may be traced in the notes s. v. INGENIATOR, and in the following extract:—"1597 Jan. 25, he had devysyt and instrument of his awin *ingyne*, to draw and make dyellis or some horologes;" SPALDING CLUB, *Aberdeen Burgh Records*, 4to., Aberdeen, 1844-48, ii, 158.

INJECTING TIMBER, see HARDENING TIMBER.

INJUNCTION. A writ prohibiting certain acts, and resembling the *interdictum* of the Roman laws. It is generally sued out *pendente lite* to prevent the doing that which could not easily be restored, pulling down or erecting buildings, ob

structing ancient lights, etc., which are among the chief cases in which the architect is concerned. The legal practice in these matters is beyond the province of this work. LIGHT. A. A.

INJURY. (Lat. *injuria*, literally, that which is *in jus*, contrary to right). Any wrong, hurt, or damage, done to any person or property. The redress of injuries is generally matter for lawyers. The architect, however, has frequently to assess the amount of injury to houses by tenants (DILAPIDATIONS; WASTE), and to property "injuriously affected" by railways or other public bodies. ARBITRATION. COMPENSATION.. A. A.

INK, see INDIAN INK.

INLAID WORK. The name for work in which the surface of the material is cut away to allow of the substitution of metal, stone, cement, wood, ivory, tortoise-shell, mother-of-pearl, or other substance, with a flush surface. The inlaying of metal on metal is used chiefly to ornament blades of swords, barrels of firearms, etc., and is generally called *damascening*; it is believed to be unknown in architectural decoration. The inlaying of marbles into the surfaces of other marble or slate or some cognate material, in plain pattern *not pictorial* or artistic, is of very old date, and mentioned in PLINY, *N. H.*, xxxv, 1, who notices that the Romans converted a single-coloured marble into a variegated one by inlaying spots of other marbles. Still more remarkable are the words of SENECA, *Ep.* 86: "nisi Alexandrina marmora Numidicis crustis distincta sunt; nisi illis undique operosa et in picturæ modum variata circumlitio prætexitur," which may be thus translated: "unless the marble from Alexandria (?oriental alabaster) be coloured with inlaid spots of Numidian (?black) marble; unless it be completely covered with a highly-wrought polish made (like that to the work of painters) by a process consisting of various stages." Among the recipes in STALKER and PARKER, *Japanning*, fol., Oxford, 1688, p. 83, mention occurs of staining pear-tree wood cut "as thick as a halfcrown, which is in all reason thick enough for any fineered or inlaid work." The word INCISED is sometimes, but improperly, employed instead of 'inlaid.' INCrustation. INLAY. VENEER.

The inlaying thin slices (*crustæ*) of marble or other rich coloured stones, as malachite, lapis lazuli, etc., in plain marble or slate, so as to form *pictorial* or other artistic designs, is called FLORENTINE MOSAIC; ALEXANDRINUM OPUS; PIETRA DURA. The like of different coloured woods, inserted into other woods in artistic forms, whether they be of natural colour or artificially stained, is called TARSIA or INTARSIAURA. The inlaying of very small pieces of precious stones or of enamels (whether of earth or glass), sometimes very little bigger than needles, or sometimes in larger sizes presenting the superficies of the ends of cubes, or parallelopipedons, secured side by side and to the bottom or ground by strong cement, and afterwards brought to a fair surface by sanding and polishing, is called ROMAN MOSAIC; MUSIVUM OPUS; TESSERA; TESSELLATED PAVEMENT. The like arrangement of small pieces of wood glued together and then cut into thin cross sections, is called 'Tunbridge work'; but this, it is believed, has never been employed in architecture. A peculiar class of work, where metal, ivory, tortoise-shell, and other materials, have been inlaid with wood, the designs having been cut out by the bow-saw or other similar contrivance, is called *buhl-work*, or more properly *BOULE*. It is believed that inlaying marble in stone is very rare; but inlaying stone steps and monumental memorials, with brass or with coloured cements, is common in Italy, where it is called INTAGLIATURA.

INLAY. The technical term appropriated to the union of metal, ivory, or mother-of-pearl, with wood. A similar use of metal and tortoiseshell (with or without wood) being known as *buhl* (properly *BOULE*) work; while the use of woods differing in colour is indicated by the words MARQUETRY and PARQUETRY.

INLET. A term generally applied to an opening into a drain or culvert.

INN (It. *locanda*, *albergo*, *osteria*; Sp. *fonda*, *posada*; Fr. *auberge*; Ger. *wirthshaus*). A house of accommodation both for travellers and for horses, which is not necessarily the case in the more modern HOTEL. This subject, as developed during the middle ages, has been treated by FRANCISQUE-MICHEL and FOURNIER, *Histoire des cabarets et des hôtelleries*, etc., 2 vols., 8vo., Paris, 1854, quoted by PARKER, *Domestic Architecture*, 8vo., London, 1851-9, iii, 46, who notices that there are "many inns of the fifteenth century still remaining in some parts of England, as at Glastonbury and Norton S. Philip's, Somersetshire (a view is given). The 'George' at Salisbury remains nearly perfect and has some good barge-boards in the yard. Chaucer's Pilgrim's inn, the 'Tabard' or 'Talbot' in Borough High-street, Southwark, was entirely destroyed by fire, but was rebuilt 1676 on the old plan; the building of that period still exists, and is a curious and interesting example. The 'Christopher' at Eton with its open galleries round the court-yard for passages after the ancient fashion, has only recently been closed. The 'Star' at Oxford has a similar gallery, and had, until quite recently, some very good barge-boards over the coach office, which were probably of the fifteenth century. The 'Belle Sauvage' on Ludgate-hill is mentioned in a will 31 Henry VI, as "called 'Savage's Inn', otherwise called the 'Bell-on-the-hoop' in Fleet-street. The 'Bolt-in-ton', Fleet-street, is mentioned as an inn, in Pat. Roll, 21 Henry VI; ARCHÆOLOGIA, xviii, 197. PARKER also notices the engraving given p. 421, of two ancient figures in wood of the size of life, apparently from the costume of the sixteenth century, and supposed to represent itinerant masons, which were fixed against a public-house opposite Wooburn church, Buckinghamshire, in 1804. They were probably the original sign of a house of call for masons. The younger of the two figures holds in one hand a pair of compasses and in the other a rule; the other has a quadrant in his right, and a walking staff in his left hand.

The inns of Southwark have been described in BUILDER *Journal*, xvi, p. 325; xix, 337; and xx, 176. A German inn in the sixteenth century, from the *Colloquies* of ERASMUS, is given in the PENNY MAGAZINE, 1845, xiv, 495, contrasted with an English inn, cir. 1600, p. 481.

INNER PLATE. That wall-plate, in a roof formed with two plates, which lies next the inside of the wall. The other wall-plate, called the 'outer plate', being nearer the outer face of the wall.

1.
INNSBRUCK (WILHELM VON). In the erection of the leaning tower at Pisa three architects are said to have been employed: viz., Bonanno, who began it August 1174; Guglielmo "di nazione (credo io) Tedesco" says VASARI; and Tommaso Pisano, some time after 1333: the last row of columns was placed about 1350 according to GRASSI, *Descrizione Storica e artistica di Pisa*, 8vo., Pisa, 1836, ii, 92, who has collected all the proofs that the work was intentionally made to incline. Two of the bells were cast 1262 and 1266, but the latter was for some time used in another place, according to MARTINUS, *Theatrum Basilicæ Pisanae*, fol., Rome, 1728, p. 129, who mentions "Willelmus, ut fertur, Germanus" as the first of the three builders. The employment of the foreigner may date after 1186 when Bonanno was alive, or between the resumption of the work 1233 and the erection by Tommaso of the belfry stage: perhaps the altered level of the fifth and two upper stories might be devised by him. There does not seem to have been any better foundation for the supposition that Wilhelm was a native of Innsbruck than the stone, which Lord Baltimore is said to have found about 1750-70 in one of the suburbs of the city, with an inscription which created great interest; viz., "Johannes Oenipontanus obliquus obliquæ vindex Pisis 1174," as given in LAMBERG, *Le Mémorial d'un Mondain*, 8vo., Cap Corse, 1774, p. 138: it is read "Obliquus vindex obliqui" in NAGLER. This discovery was soon considered suspicious, and it is now disregarded: but MORRONA, *Pisa*

Illustrata, 8vo., Leghorn, 1812, i, 407, saying that the tower was built by "Guglielmo d'Inspruk e Bonanno Pisano," adds "si trova in antiche scritture dell' opera, che fu la vigilia di S. Lorenzo il giorno, in cui fu dato principio alla fabbrica; e son precisamente indicate i due citati architetti, se non che in vece di Guglielmo Tedesco, si dice Giovanni Onnipotente di Germania per la mala interpretazione della parola Oenipons, o Oenipontanus, che significa nativo d'Inspruk." If any earlier authority is meant by CICOGNARA, *Storia della Scultura*, fol. Venice, 1813, i, 191, mentioning DEMPSTERO as satisfied that the work was done by Wilhelm von Innsbruck, the reference is so vague as to prevent a search for the original passage.

INOSCULATING COLUMN, see CLUSTERED COLUMN.

INSANE (HOSPITAL FOR THE), see LUNATIC ASYLUM.

INSECT. Several kinds of insects create much annoyance in houses and buildings. DU CANGE explains that the late Latin term *assalia* is applied to all insects that attack timber, inclusive of the cossus, teredo, termes, tipres, and xylophagi. The common ANT has already been described.

Bugs and fleas are supposed to be frequently introduced into new houses by workmen leaving their wearing apparel about while at work. Washing the walls, skirtings, and cornices, with corrosive sublimate, and then constant watching to destroy such as make their appearance, is perhaps the best remedy, unless they are excessively numerous, in which case, burning sulphur in the room, or forming chlorine gas (a deadly poison) under proper chemical supervision, has been attended with good results in freeing rooms and houses of all insects and animals. But these violent remedies will be found to discharge colours in the decorations, etc., of the rooms. The plant wormwood, as likewise erigeron with its fetid smell, and many species of the same family, are considered efficacious in driving away insects. Painting the walls with laurel oil will entirely rid even a butcher's shop, of flies. Gilt frames can be preserved unsoiled by its application; the scent is not considered unpleasant. Many 'insect powders' so advertised have proved efficacious.

Carbolic acid, obtained from creasote by distillation, is said to be useful in preserving animal substances and killing insects; but like creasote, is perhaps of no avail after the scent has evaporated; creasoted timber is considered proof against the attacks of the white ant and of the teredo. The resinous odour from fir and larch seems to keep insects at a distance.

The *BUILDER Journal*, xvii, 274, 304, notices the case of a church, which after the insertion of a heating apparatus in a vault formerly used for burials, and of flues in the ground under the paving, became infested with minute insects. They were said to have been called into existence from some old wood in the soil, by the heat. The church was freed from them by a layer of lime on the ground, brushing the insects off the seats like dust, and revarnishing. Wood lice are also troublesome in country houses. The weevil is prevented in a GRANARY by proper ventilation; while turpentine, or the resinous boughs of the thuja and Virginia cedar placed in wheat, is said to drive it out. CURTIS, *Farm Insects;—which infest Barns and Granaries*, 8vo., Glasgow, 1860. The butter-nut wood of Canada was formerly extensively used for cabinets for entomological collections, as it had the property of repelling the attacks of insects, and was not liable to warp or twist: it is not so well known as it deserves to be.

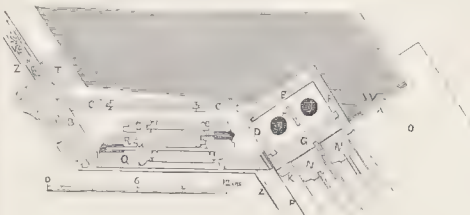
Many woods used in building operations are liable to be attacked. Thus the alder is very subject to a beetle; in France the *sabots* are smoked to harden and render them impervious to the larvæ. The dactyldium is said to be noxious to insects or at least repellent to their attacks. The bhyeng-tseng of Amherst, and the determa of British Guiana, do not appear to be subject to their attacks. The eucalyptus and the Georgia pitch pine are known to be exempt from the attacks of the white ant; TERMES. It is said that although the European white deal obtained from the Norway spruce fir and the wild pine, are

liable to the attacks of a beetle (the bostrichus piniperda), the American white deal is exempt. It is doubtful whether, on the contrary, the American is not more a favourite of the death-watch, anobium striatum and tessellatum, than the European pine. TEREDO; WORM.

INSERTED COLUMN. A column partially inserted in a wall, or built in it.

1. 19.

INSIDE BEAD of a window frame. The large bead κ, continued round the frame, which retains the lower half of the



sash in its place. It is generally made 1 in. by $\frac{7}{8}$ in., and the side beads are broken by removal for cleaning or repairing the windows. In the best work it is made $1\frac{1}{4}$ to 2 ins. deep and secured by screws with countersunk heads; they are thus easily removed and replaced without damage. In large buildings the window has a beaded lining of 5, 6, or more inches in width, in lieu of the mere bead, and it is often made of wainscot or mahogany to correspond with the other work of the window.

INSIDE LINING of a window frame. The lining D, returning from the pulley stile C, to the back lining F.

INSINA or ANSINA. An ancient name for Antinoë in Egypt.

INSPECTOR. A designation given to a person who is authorised to survey for special purposes; he is generally a deputy or assistant to the surveyor or head officer.

INSTALMENT. The term given to an advance, made to a contractor, being a part of the amount of his contract due to him for a specified quantity of work done by a stated time. Instalments are generally paid on the written certificate of the architect, which should be required in a clause of the specification, as it has been ruled that a verbal statement is otherwise sufficient to carry the amount. CONTRACT.

INSTRUCTION. The instruction necessary for an architect may be considered under two heads. First, the indication of the general course and line of study to be followed; the subjects upon which the attention of the pupil should be directed; and the order or method to be observed. Secondly, instruction in the details of each particular branch. In architecture there are two departments; the æsthetic, and the practical. These should be pursued as nearly as possible *pari passu*, since they are both integral and equally essential parts of the science: the practical furnishes the means, the instruments, and the rough material, out of which the æsthetic, the true end and aim of art, is to be wrought. ARCHITECT.

On the continent, particularly in Germany, the education of the architect is most systematic; and the pupil is thoroughly instructed in the most essential branches of the art, both theoretically and practically, before he is legally competent to exercise his profession. In England this methodical training is too much neglected, and the pupil left to the chance of what he can pick up in the routine of office business, added to the acquirements of his own industry. Experience, the only true test in these matters, may occasion a hesitation before unqualified approval is given to the continental system; for the nature of instruction should be to guide and discipline the natural ability, enabling it to work with the experience of those, who have gone before, to concentrate its efforts on the proper points and to direct them by short methods to the end in

view. But it should not be that which encumbers the mind without enriching its natural resources, and binds down and cramps its energies to the mechanical work of line and rule; instead of training it to expand and adapt itself to the circumstances of the case, and to fly, as it were, on its own wings guided only by the light of sound and well apprehended principles.

Architecture is so thoroughly a practical art, that it can only be properly learnt in those places, as in the office of the practitioner, where the actual necessities of life are to be dealt with; for it must be remembered that the circumstances, the necessities, the wants, and the feelings, of the day, are the essential conditions upon which the architect works, the starting point from which he commences; and that his true and proper vocation is to accept these without reserve, deeming it the advantage and glory of his profession to refine there what is gross and material, to combine in order, symmetry, and proportion, what is rude, uncouth, and unshapely, and by delicate touches of art to invest even the common things of life with poetry and feeling. It is however much to be regretted, that there exist in England so few opportunities for students to acquire in a regular and systematic manner those higher branches of professional accomplishment, which do not fall within the ordinary range of office practice; and which, if not absolutely necessary, are of infinite advantage from the cultivation they impart to the mind and taste.

The student in architecture should bear in mind the special object to be obtained by means of instruction. As an architect he should, of course, be thoroughly acquainted with the materials with which he has to deal; the methods of putting together and combining them in one work; their chemistry; their value and mode of measurement. He should be conversant not only in the usual methods of transacting business; but in the general principles of the laws of contract, in those which affect the responsibilities of his own profession, and in those which relate to the rights of property, public and private, upon all which points questions will be constantly arising in his professional practice. He should be an accomplished and facile draughtsman, and he should be constantly employing this power in accumulating ideas from the stores of nature and the works of others, and in training and exercising his own powers of invention; he should be well versed in the theory of colours and skilful in their practical application; and should lose no opportunity of acquiring that ultimate knowledge of the sister arts of painting and sculpture, which will enable him when he is called upon to do so, to avail himself of their assistance with the happiest result. He should know much of his art by books, but more by actual observation. He should know well its history, and the features of those various phases under which architecture has appeared at different ages and in different countries, denominated styles, not indeed to enable him to counterfeit each with the greatest success, but to make him more skilful in giving expression to the sentiment of his own day by studying the arts of those ages in which it was practised under more pure and natural influences. If to these he can add higher accomplishments, and especially an acquaintance with the best literature of the best times, ancient and modern, he will feel his resources extended and his intellect sharpened and invigorated.

To those indeed who feel an ambition to rise to the front rank of this noble profession, so wide in its scope and so elevating in its pursuit, no kind of knowledge can come amiss, for even those more abstract and higher branches which have no immediate bearing on professional practice, will help to cultivate and refine the taste, and enrich the ideas to stimulate the imagination, and generally to give acuteness and vigour to powers of the intellect upon the perfection of which the production of art in its true sense depends. He need not indeed be a master in every branch thus enumerated, but the rule should be "his non imperitus," and the more manifold his accomplishments, if digested with thought and reflexion, the

greater will be his resources and the more capable will he be of rising equal to any opportunity that may offer. H. B. G.

The *ateliers* of those French architects, who devote themselves to tuition, uphold the excellence of the system devised by Blondel, who, perceiving in 1743 the necessity for something more than elementary instruction to the architectural student, proposed to show him a canon of criticism upon buildings in respect to science and to art. It must be allowed that this systematic canon is even now very incomplete: the supporters of pre-mediæval and of post-mediæval art do not accept many of the axioms upheld in the theory or practice of the students of mediæval art; and there must be something wrong in the principles enumerated on one side or the other, or perhaps on both sides, for every one ought to be bound by any sound system of aesthetics, formed upon the one certain basis, the laws which nature exhibits in all her works. Experience since 1743 has shown that few architects of mature age are willing to abandon the recompense of employment which perseverance obtains for industry, in order to subject their later years to the inconveniences of literary conflict, if they publish the canons that they imagine they have discovered; or in order to devote themselves to the education of their successors. Indeed, in England, the fashion of the day, in architecture as in engineering, is to select for a teacher some one of the professional men who are actively engaged in works that will allow them no time for educating their pupils, and who often candidly state that the pupil must gather what instruction he can in the routine of office work. The course of collegiate instruction in architecture pursued in England, where there is no public (*i. e.* governmental) attention paid to the subject (except in training draughtsmen who become the architects for the various departments of the public military and civil services at home and abroad) is considerably different from that of foreign government institutions.

The advantages and defects, the aggregation and connection, of materials, whether natural or artificial; drainage; heat; light; ventilation; water; the history of styles; and the necessities of plan, may be well taught even in classes by an efficient instructor, because almost all that he would have to state may perhaps yet be printed: the existence of such classes undoubtedly affords opportunities of instruction to as large a sphere as possible, as exemplified to a great extent in GWILT, and in CRESY, *Encyclopædia*; the theory of making surveys, drawings, specifications, and estimates, inclusive of measured work, and dilapidations, together with valuations of all kinds, is instruction; but the practical application of this knowledge, is EDUCATION.

This DICTIONARY, like its predecessors, and like those works which profess to contain 'a Body of Architecture', is rather an aggregation of arranged information than a full course of study: it is not certain that any such course can be better suggested than by the master who comprehends the particular condition of the individual pupil. Among the few books that have indicated, in an impartial and extensive spirit, the natural and acquired accomplishments that are really requisite in the modern architect, it may be sufficient to mention as suggestive, BLONDEL, *Discours sur la manière d'étudier*, 4to., Paris, 1747; and *Discours sur la nécessité d'étudier*, 4to., Paris, 1752; DONALDSON, *Architectural Axioms*, 8vo., London, 1847; MOORE, *Essay*, in WEALE'S *Quarterly Papers*, 4to., London, 1843; the ROYAL INSTITUTE OF BRITISH ARCHITECTS, *Questions*, 8vo., London, 1841; and ROBERTS, *Short Hints*, 16mo., London, 1852. The systems of instruction and examination in Prussia, in Spain, and in France, are noticed in papers read at the Royal Institute of British Architects 1855, November 5 by TITE, *Condition and Prospects of Architecture*; November 19 by PAPWORTH, *A Diploma*; and Dec. 3 the *Discussion* thereon; and by BURNELL, *Present Tendencies of Architecture, and Architectural Education*, and *Discussion*, in *Transactions* of the Institute 1865. From the pen, apparently, of TRÉLAT have proceeded several pamphlets to express the views upon the

recent and present state of architectural instruction in France, that are held by several of his official, professional, scientific, and artistic friends who have supported the foundation of a school that is intended to supersede the ateliers, which until 13 November 1863 supplied pupils to the École des Beaux-Arts. These works are entitled *L'Enseignement des beaux arts*, 8vo, Paris, 1864, which treats of the condition of the French instruction in art; *L'école centrale d'architecture*, 8vo., Paris, 1864, which is the same subject viewed with regard to that art alone; *Programme des conditions relatives à l'admission des élèves*, 8vo., Paris, 1865, requiring a knowledge of equations of the second degree as well as spherical geometry; and *Programme de l'enseignement*, 8vo., Paris, 1865, which resembles the syllabus of the courses delivered by the professors of architecture, etc., in the University of London. These professors examine their pupils. Another system, the Voluntary Architectural Examination instituted by the Royal Inst. of British Architects, offers to students a means of measuring their own progress in the two stages indicated by the *Regulations, Papers of Questions*, etc., 4to., London, 1862, and later.

INSTRUMENTS for drawing, see **DRAWING INSTRUMENTS**: for working, see **TOOL**, and the respective heads, as **BRICK-LAYER**, etc.: and for special purposes, as **LAND SURVEYING**, etc., see **MATHEMATICAL INSTRUMENTS**.

INSTRUXIT. A word used in an inscription "Cola Amatricius architector instruxit", supposed to date 1525-42, **FILOTESIO** (N.), which has not received any satisfactory explanation.

INSULA. The classic name for a detached house; as noticed in **FESTUS**, s. e. Cicero, pro M. Caelio, 17; **VITRUVIUS**, i, 6; and ii, 9. The term is in use to this day in Italy for a block of land with streets on each side, and having one or more dwellings or other buildings on its area.

A. A.

INSULAR and **INSULATED**. Terms applied to a building, column, or other work, standing by itself, so that all sides of it may be seen. It has the same meaning as "detached."

INTAGLIATURA. The term given to work inserted generally into marble or stone, in various designs, and of different materials. The most usual subjects are the tread and risers of stairs, and monumental memorials, which are inlaid sometimes with brass and sometimes with coloured cements. The metal decoration is let into grooves made for the purpose, a little undercut; the brass itself is also somewhat undercut to receive the cement which keeps it from springing up. Where cement only is used the stone is simply undercut for the like purpose. The cements are generally of quick lime, oil (or white of egg), and colouring matter.

A. A.

A paper by **BURGESS**, on the subject of such work in the **BUILDER** *Journal*, 1855, xiii, 304 with illustrations, notices that Dante speaks of the pavement of the first circle of the hill of purgatory as resembling the monumental slabs in the floors of churches; and adds, that such incised stones for pavements seem in the middle ages to have been first used in conjunction with mosaic, describing the tomb dating 1109 which had been discovered in the ruins of the church of S. Bertin at S. Omer. The same paper gives an account of the restored pavement, supposed to date 1200-50, of the old cathedral in that city; the original pieces before the altar of S. Thomas à Becket in the cathedral at Canterbury; the untouched fragments, attributed to the year 1300, from the church of S. Nicaise now in that of S. Remi at Rheims, which have been published by **TARRÉ**, *Trésor des églises de Reims*, fol., Reims, 1843; the scattered slabs supposed to have been taken from the cathedral at Therouenne, in the church of the village of Blaringhem near S. Omer; and engravings of others in **WILLEMING**, *Monumens Inédits Français*, fol., 1806-39. An account is also given of similar pavements in the baptistery at Florence, and in the cathedral at Siena. All these have more than lines, they have narrow grooves, sometimes undercut, to be filled with cement; or with lead, as done to those of S. Nicaise; and on the risers of the

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steps of a staircase at a church at Venice: the black cement now in the lines of those of the cathedral at S. Omer is modern. In Italian work of this class the lines were first formed of holes by the drill, in the way now employed for *pointing* a marble bust or statue from the model; and as the holes were deeper than necessary for the lines, perhaps to hold the lead, they sometimes show the direction of lines that are obliterated by wear. The lines of the drapery, the features, etc., are formed by these incised lines filled with the cement on white marble, the ground being dark cement or black marble. The *dalles* or slabs at S. Omer and at Blaringhem have been published by **WALLER**, *Description du Pavé*, etc., 4to., and pl. fol., S. Omer, 1847; whose remarks p. 7 on the receipts for the cement may be useful; and a restoration by him is given in **DIDRON**, *Annales Archéologiques*. **DIAGLYPHIC WORK**.

After noting that fine examples are still preserved at Rome, Ravenna, Lucca, and many other Italian cities, which belong to the Romanesque period, or are in imitation of the peculiar circular geometrical patterns usually characteristic of them, **WARING**, *Arts connected with Architecture*, fol., London, 1858, p. 19-25, pl. 22-34, proceeds to examples from Florence, Pisa, Pistoia, and Siena, of that distinct class which he considers due to Tuscany, which, he adds, "is used largely as a relief to large surfaces of wall, and with excellent effect" as on the façade of the duomo at Pisa. The figure subjects are executed with an inlay of grey marble for the shadows and a ground of white marble, the outlines and hatchings of the shadows being incised and filled in with mastic or some hard substance; the recipe for which, dated 1444, he gives from **RUMOHRE**, *Ital. Forschungen*, 8vo., Berlin, 1827-31, ii, 381. This application of Florentine mosaic has been introduced into England by **Triqueti** in the recent (1864-65) restorations at Windsor Castle.

INTAGLIO. The name for a flat bas-relief sunk into the stone or metal, as the matrix for a seal. It is used in contradistinction to the word *cameo*, which means a sculpture in low relief. Both the cameo and intaglio are in higher or lower relief than the coin or medal, but less than the ordinary **BASSO RELIEVO**.

A. A.

INTAILER. A term used in the fifteenth and sixteenth centuries to denote a carver or sculptor, in opposition to the *latomus* and *cementarius*. The *Fabric rolls of York* mention that out of ten masons at work, one in 1485 was "Willielmo Bussell, entayler"; in 1498 John Fothergill, intailer; in 1504 Robert the intailer and his servant received £1 16s. for six weeks work. In 1516 Robert Waterton is the 'enteiler'. One 'intaler' in 1529-30, and one 'intailer' in 1530-1, are also mentioned.

INTAILYNG. A general term for carving; it occurs in the same *Rolls*; 1478-9, "Jacobo Dam, carver, pro intailyng clxxv crokettes, 14s. 7d." for the screen.

INTARSIATURA. A species of inlaying or veneering wood on wood in pictorial forms common in North Italy, but apparently little known elsewhere. It strongly resembles Florentine mosaic, as formed by veneers of marbles or precious stones. A ground is chosen generally of dark walnut wood; into this are inserted various devices to form pictures in different coloured woods. Sometimes the woods inserted are of their own natural colours. Sometimes they are stained. The whole arrangement much resembles the design for pot-metal stained glass, but of course the colours are all of a low grade compared with those which may be obtained from glass, lapis lazuli, malachite, etc. The different pieces which form the composition are generally bordered with very thin slips of dark wood, which have much the same effect as the leads in stained glass windows. They are said to be wedge-shaped, and contrived to hold the veneers down; their backs being planed off when the work is set. In the hands of a skilful artist intarsiatura is a very pleasing decoration. **TARZIA**. A. A.

INTAVOLATA, or *gula intavolata*. The Italian term used

in architectural works of the last century, for the CYMA of an entablature.

INTENDANT. A French word naturalised to some extent in England; for 13 June 1722 Capt. Chelly was made 'master intendant of the works' at Greenwich hospital, in the room of Capt. Faulkner.

In France the 'contrôleur-général', established 1547, seems to have been equivalent to 'chancellor of the exchequer'. The principal clerk was the surintendant de finance, whose intendants had charge of the public service. The intendants de finance were sent by Richelieu into the provinces to enforce observance of the royal edicts, proclamations and regulations in the management of finances by the collectors of taxes; they superseded the 3000 treasurers, and, having no judicial office, their decisions in matters of local government, police, and taxation, could be altered by the minister alone. They thus became governors of the provinces; and when the intendant was an amateur, the architectural aspect of the city was sure to change. The present reputation of Bordeaux in this respect is due to L. U. Aubert, baron de Tourny, intendant 1743-58. They were suppressed 1790.

The office of surintendant (also called directeur) des bâtiments de la couronne is said to have been created after 1744 by Louis XV in favour of the marquis de Marigny, brother of Madame de Pompadour, who consequently had the inspection and control of all the royal residences—but in 1655 A. Ratabon who died 1670, and in 1699 J. H. Mansard who died 1708, had the title of surintendant des bâtiments du roi. The only name of importance amongst the intendants des bâtiments du roi seems to be that of J. de la Motte in 1722, he died 1738.

It will be useful to add to the notes given *s. v.* CONTROLLER, that a difference existed between the offices of contrôleur-général, and contrôleur, des bâtiments du roi. The first title is affixed to the names 1709 of Desjardins; 1710 of J. R. de Cotte, who died 1767; and 1724 of J. C. Garnier, seigneur d'Isle, who died 1755: whereas the latter rank was held 1700 by J. Gabriel, who died 1742; 1702 by P. Lambert, who died 1709; and 1763 by A. Gabriel, who died 1781.

The surintendant or intendant then seems to have been superior to the contrôleur, for R. de Cotte was made 1699 architecte du roi and contrôleur général; but 1708 chief royal architect, intendant, and ordonnateur général of royal buildings, gardens, arts and manufactures, etc. He died 1735, and his son J. R. de Cotte was 1710 contrôleur général, and 1736 intendant général. This subordination appears also to have existed in the corps des mines, which before 1788 was ruled by a grand maître surintendant, a lieutenant-général, and a contrôleur: after that period the chief officers were an intendant with two commissaires. They are now ingénieurs en chef du corps des mines.

INTERAMNA, see **TERNI**, in Italy.

INTERAXAL SYSTEM OF PROPORTION. A system of designing on equidistant parallel axes drawn both ways so as to form squares to a dimension arranged in the first instance. The walls are then placed centrally upon the axes, and the columns, pilasters, etc., upon the intersections of the axes; the doors, windows, niches, and the like, come centrally in the interaxes, or are otherwise arranged. On this system was designed and carried out, the building for the International Exhibition 1851, for which sort of building it is peculiarly fitted, by presenting a continual repetition of the same features, which, therefore, are more readily executed. GWILT, *Encyc.*, has devoted several sections to this subject, chiefly derived from DURAND, *Précis d'Architecture*, 4to., Paris, 1819-21. It is in fact the proportion of the square, in contradistinction to that of the equilateral triangle.

INTERBALUSTER. The space between two balusters. For good effect it should not be more than half the diameter of the baluster at the thickest part, nor less than one-third of that diameter.

INTERCAPEDO. The name given to the passage of communication between the two chambers, the caldarium and the laconicum, the flooring being over the hypocaust, as shown



in the painting on the walls of the baths of Titus. LUCIAN, l. c. 7, notices that by its use the bathers need not retrace their steps through the whole suite of apartments by which they entered, but could return from the thermal chamber by a shorter circuit through a room of gentle temperature which communicated immediately with the frigidarium. 59.

INTERCOLUMN (Lat. *intercolumnium*; Fr. *entrecolonne*). The clear distance between two columns measured at the lowest diameter of the shafts.

INTERCOLUMNIATION (Fr. *entrecolonnement*). The proportion of the intercolumn to the lowest diameter of the shafts. The Greek names, preserved by VITRUVIUS, iii, 2; iv, 2 and 7, for the five kinds of temples that differed in the proportional extent of the intercolumn, are applied to the respective intercolumniations. These are (1) **PHYCNOSTYLE**, equal to $1\frac{1}{2}$ diameters or 3 modules, used only in the Ionic and Corinthian orders; (2) **SYSTYLE**, equal to 2 diameters or 4 modules; (3) **EUSTYLE**, equal to $2\frac{1}{2}$ diameters or $4\frac{1}{2}$ modules; (4) **DIASTYLE**, equal to 3 diameters or 6 modules; and (5) **ARÆOSTYLE**, equal to 4 diameters or 8 modules, according to the practice of the modern Italian masters. Coupled columns are placed at $\frac{1}{2}$ diameter or 1 module apart. The **ARÆOSTYLE**, or arrangement consisting of columns $\frac{1}{2}$ diameter apart followed by a space of $3\frac{1}{2}$ diameters or more, is generally said to have been invented by Perrault, who used it at the Louvre: it was adopted by Wren at St. Paul's cathedral. These intercolumniations determined the number of columns that should be employed under a pediment with regard to the width of frontage; for example, in the eustyle, with an Ionic order, as soon as the division of the width into 11, 18, or 24 parts was calculated, the diameter of the column was known: and as the column would be $8\frac{1}{2}$ diameters in height, the architect could proceed to consider the size of the essential parts; especially sufficient room for the passage of two matrons arm-in-arm, assumed by VITRUVIUS to be a minimum of convenience, and to necessitate that extra width of the central intercolumn upon which he insists in his remarks, iv, 7, on the Tuscan, and iv, 3, on the Doric, system.

The intercolumniations in the Doric order are narrow, adding to the general character of grandeur and solidity. One diameter is the general proportion, but in some examples one and a half; and, in an ancient temple in Sicily, less than one diameter. The Doric order is necessarily regulated by its triglyphs, which always fall over the axis of the columns; except in those examples where, at the angle of the building, it is placed at the angle of the frieze. The difficulty of this arrangement is noticed by VITRUVIUS, iv, 3, who supposes that a law of æsthetics is violated by the Greek contraction of the intercolumniation at the angles; but sees no other remedies than an addition of the width of half a triglyph, or the addition of a half metope at the angle. He insists that the metope should be square, but an increase of the average width equal to $\frac{1}{8}$ each on the metopes over the angle intercolumn has been observed.

"The peristyle in the earliest examples had wider intercolumniations in the front than in the flanks. This arrange-

ment occasioned, as it may be remarked by the way, a defective variation in the division of the metopes and triglyphs, which arose from the necessity of giving width to the fronts for convenience of access; the expense and risk of architrave stones of equal length was thus economised in the flanks,—this is observable at Corinth, Syracuse, and Selinus. With greater experience of the strength and durability of these architrave stones, this rule was reversed, and additional width was sometimes given to the side intercolumniation, to extend the length of the whole, as in one of the temples at Selinus. In the earliest examples, the width of the peristyle in the flanks and front is narrow. In the Theseum we discover the first step towards a marked improvement in the greater spaciousness of the eastern portico, which is equal to nearly two intercolumniations; this is still further extended at Phigaleia (420 B.C.), and at Nemea: the same principle is also to be observed at Agrigentum, Selinus, and Paestum, and may be considered a proof of their comparatively recent date; in many cases, as at Selinus, it is very considerably widened in the flanks; and it may be remarked here, with reference to the intercolumniation of the order, and the progressive improvement in the capacity or spaciousness of the peristyle, that the conviction which Hermogenes (VITRUVIUS, iv, 3) justly declared of the inconvenience of the Doric style for temples, and the greater spaciousness afforded by the Ionic, was felt long before, and thus in a great measure remedied by successive experience." COCKERELL, *Temples at Ægina and Bassæ*, fol., Lond., 1862, p. 15.

In the Ionic, Corinthian, and Composite, cornices strict adherence to the above named intervals produces some irregularity in the arrangement of the modillions and dentils, which, though not offensive, is better avoided by a slight modification of the intercolumniation. Vignola makes the eustyle spacing equal to $2\frac{1}{2}$ diameters in all but the Doric order. The interval in the Tuscan order has occasionally been made very wide, sometimes above seven diameters, which, as the architraves were of wood, was practicable.

"The central intercolumnium of the temple at Magnesia, is found to be three-fourths of a diameter greater than the other intercolumnia; and VITRUVIUS states that such was exactly the proportion of the central intercolumnium to the others in the eustylus, a disposition so called as being the most harmonious mode of proportioning the diameters to the intercolumnia. The other intercolumnia, however, do not bear so large a proportion to the diameter of the column as the eustylus required"; LEAKE, *Asia Minor*, 8vo., London, 1824, p. 349. In the pseudo-dipteral temple at Aizani, in order to gain width in the cella, the intercolumniation on the sides being 8·320 ft. between the centres except at each end, where it is 8·317, that in the front is 8·34 ft. at the angle, also 8·34 ft. adjoining it; the next one 10·34 ft., and the centre intercolumniation 12·00 ft.; TEXIER, *Asie Mineure*, fol., Paris, 1839-49, i, 119, pl. 28.

With regard to engaged columns or pilasters, or such as are near the walls of a building, the intercolumniations are not limited to the above spaces, but sometimes depend on the width of the arches, windows, niches, or other objects, and their decorations, placed within them. But detached columns supporting architraves must be near to each other, both for the sake of real and apparent solidity. QUATREMÈRE DE QUINCY, considering that the Vitruvian rules were meant to apply solely to the columns of temples, notices that the larger spaces had been unsuccessfully used in some modern buildings; and he adds with justice that, if majesty is lost where any of the three largest intercolumniations are observed, columns should not be employed.

Taking the first volume of CAMPBELL, *Vitruvius Britannicus*, fol., London, 1717, and proceeding through the designs represented therein, the following table exhibits the license employed in using the intercolumniations, by some of the early masters of the Palladian school in England.

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| Order | Description. | Diam. | Place. | Architect. |
|------------|----------------------------|-------|--------------------------|------------------------|
| Doric | Engaged cols., Ionic over | 1 1/2 | Adrian (by) | C. Campbell |
| | Composite pilasters | 1 1/2 | Castle Howard | Sir J. Vanbrugh |
| Ionic | Engaged cols., Cor. over | 3 | Banqueting house | L. Jones |
| | Engaged columns | 3 | Queen's house, Greenwich | L. Jones |
| | Pilasters | 1 | Lindsey house | L. Jones |
| | Engaged columns | 4 | Islay | C. Campbell |
| | Pilasters | 1 | Chatsworth | L. Jones |
| Corinthian | Columns | 4 | Somerset house | L. Jones |
| | Columns | 3 1/2 | Gunnorsbury | L. Jones |
| | Columns, portico | 3 1/2 | Walsley | C. Campbell |
| | Arade | 3 1/2 | Haftax | C. Campbell |
| | Pilasters | 2 1/2 | Powis house | L. Jones |
| | Pilasters | 3 | Burlington house | L. Jones |
| | Pilasters | 4 | Stoke Edith, Heref. | T. Foley |
| | Columns and pilasters | 1 1/2 | Blenheim | Sir J. Vanbrugh |
| | Ditto | 2 1/2 | Castle Howard | Sir J. Vanbrugh |
| | Pilasters (back) | 1 1/2 | Greenwich hospital | J. Webb after L. Jones |
| | Pilasters, sm. range (do.) | 3 1/2 | | |
| | Engaged columns | 1 1/2 | | |
| Composite | Arade | 3 | Duke of Argyle | C. Cresswell |
| | Columns, portico | 3 1/2 | Wilbury house | W. Jones |
| | Pilasters, arcade | 4 1/2 | Stainborough | |

INTERDENTIL. The space which separates a pair of dentils; it also designates the plain or ornamental feature which occurs in that *intersectio* or *metope* between two dentils. This feature, quite plain, is slightly visible in the Ionic order of the temple at Eleusis, and in that to Minerva Polias at Priene; in the Corinthian order of the temple to Jupiter Stator at Rome; and in the Composite order at Myra: it was adopted by Jean Goujon at the Louvre, and by the Italian masters. At Rome there are several examples of this feature: in the Doric order of the baths of Diocletian, it is part of the face of the dentil; in the Ionic order of the theatre of Marcellus it is rather a sloping face; but in that of the temple to Fortuna Virilis it is almost a second dentil. The moderns, however, do not seem to have cared to perpetuate the enriched interdental, which in the Corinthian order occurred in the temple to Peace, the arch of Constantine, and the temple to Jupiter Tonans; and especially in the attic story of the building called the forum of Nerva. In the Composite order examples of its use are furnished by the arch of Titus, and the arch of the Goldsmiths. The remarkable manner in which some of these examples are undercut as well as perforated, is shown in the *Illustrations*, s. v. Dentil, plates, 1857-8, part 2. The interdental or *intersectio* was made wider in the Greek than in the Roman examples: in the temple to Minerva Polias at Priene it is nearly three-fourths of the width of the dentil; at the temple of Bacchus at Teos it is two-thirds, which is the amount prescribed by VITRUVIUS; at Eleusis it is rather less; but at Rome in the temple to Jupiter Stator it was made a little more than half; in that to Jupiter Tonans little more than a third, and in the arch of Constantine almost exactly a third.

INTERDOME (Fr. *entrecoupe*). The space betwixt two shells of a dome, or between two domes, one covering the other, as in the cathedral at Florence; S. Peter's; and the church of Sta. Maria di Loreto at Rome, etc. Sometimes there are two interdomes, as in the churches of S. Geneviève and of the Hôtel des Invalides at Paris. ISABELLE, *Edifices Circulaires*, fol., Paris, 1855.

INTERDUCES. The same as INTERTIES to a partition. 2.

INTEREST. The term given to the sum or rate at which a borrower pays for the loan of certain capital. It may be defined as the compensation a borrower pays a lender for the opportunity of making a profit of money which the latter entrusts to him. The word interest is probably derived from the Latin third person singular of the word *intersum*, and intended to signify the difference, or *interim* value between the profits derived or earned by the money of the lender and the labour of the borrower.

Interest is of two kinds, *simple* and *compound*. In the first case the sum is merely a rate per cent. payable at certain periods, and if this sum be not paid regularly no charge is made in the arrears. In the second case it is not only as the former, but is also payable on the interest due as well as the

principle, and is often defined as interest upon interest. This latter species of interest is the basis of all calculations of reversions, sums invested to accumulate, and all deferred payments. The calculations are abstruse except to the practised mathematician, but are much facilitated by the use of tables. The usual tables are five in number. The first is the sum to which any principal money invested at compound interest will amount in any definite number of years. The second table is the present value of £1 due at the end of any number of years. The third table is the amount of £1 per ann. in any number of years. The fourth table is the present value of £1 for any number of years. The fifth table is the annuity which £1 will purchase for any number of years. Other tables have been prepared for various purposes, but the above are most generally used. It has been said that it is practically impossible to make compound interest, as the money cannot be received the moment it is due, and as there can be no re-investment without delay and expense. As, however, tables are generally calculated for a sum to be paid at the end of a year, and practically interest is generally paid half yearly, the interest on such payment will compensate for any loss caused by delay.

TABLE OF THE PRINCIPALS YIELDING EQUAL AMOUNTS OF INTEREST; ARRANGED BY A. ASHPITEL, F.R.I.B.A.

| Years | Annual | 3 per | 3½ per | 4 per | 4½ per | 5 per |
|-------|--------|-------|--------|-------|--------|-------|
| 1 | 100 | Cent. | Cent. | Cent. | Cent. | Cent. |
| 10 | 100 | 30 | 35 | 40 | 45 | 50 |
| 11 | 91 | 30 | 35 | 41 | 46 | 51 |
| 12 | 83 | 30 | 35 | 42 | 47 | 52 |
| 13 | 76 | 30 | 35 | 43 | 48 | 53 |
| 14 | 70 | 30 | 35 | 44 | 49 | 54 |
| 15 | 64 | 30 | 35 | 45 | 50 | 55 |
| 16 | 59 | 30 | 35 | 46 | 51 | 56 |
| 17 | 54 | 30 | 35 | 47 | 52 | 57 |
| 18 | 50 | 30 | 35 | 48 | 53 | 58 |
| 19 | 46 | 30 | 35 | 49 | 54 | 59 |
| 20 | 42 | 30 | 35 | 50 | 55 | 60 |
| 21 | 39 | 30 | 35 | 51 | 56 | 61 |
| 22 | 36 | 30 | 35 | 52 | 57 | 62 |
| 23 | 33 | 30 | 35 | 53 | 58 | 63 |
| 24 | 31 | 30 | 35 | 54 | 59 | 64 |
| 25 | 28 | 30 | 35 | 55 | 60 | 65 |
| 26 | 26 | 30 | 35 | 56 | 61 | 66 |
| 27 | 24 | 30 | 35 | 57 | 62 | 67 |
| 28 | 22 | 30 | 35 | 58 | 63 | 68 |
| 29 | 20 | 30 | 35 | 59 | 64 | 69 |
| 30 | 18 | 30 | 35 | 60 | 65 | 70 |
| 31 | 17 | 30 | 35 | 61 | 66 | 71 |
| 32 | 15 | 30 | 35 | 62 | 67 | 72 |
| 33 | 14 | 30 | 35 | 63 | 68 | 73 |
| 34 | 12 | 30 | 35 | 64 | 69 | 74 |
| 35 | 11 | 30 | 35 | 65 | 70 | 75 |
| 36 | 10 | 30 | 35 | 66 | 71 | 76 |
| 37 | 9 | 30 | 35 | 67 | 72 | 77 |
| 38 | 8 | 30 | 35 | 68 | 73 | 78 |
| 39 | 7 | 30 | 35 | 69 | 74 | 79 |
| 40 | 6 | 30 | 35 | 70 | 75 | 80 |
| 41 | 5 | 30 | 35 | 71 | 76 | 81 |
| 42 | 4 | 30 | 35 | 72 | 77 | 82 |
| 43 | 3 | 30 | 35 | 73 | 78 | 83 |
| 44 | 2 | 30 | 35 | 74 | 79 | 84 |
| 45 | 1 | 30 | 35 | 75 | 80 | 85 |
| 46 | 1 | 30 | 35 | 76 | 81 | 86 |
| 47 | 1 | 30 | 35 | 77 | 82 | 87 |
| 48 | 1 | 30 | 35 | 78 | 83 | 88 |
| 49 | 1 | 30 | 35 | 79 | 84 | 89 |
| 50 | 1 | 30 | 35 | 80 | 85 | 90 |

The use of this table is exemplified in the following cases:—
 i. If 27 years purchase were given for an estate, the amount will be the same as if consols were bought at 81; or 8½ per cents at 94½; or railway shares paying 4½ per cent. at 121½; or preference shares at 5 per cent. at 135; and each investment would yield £3 14s. 1d. per cent. as annual income.

ii. If consols are at 87, the 3½ per cents ought to be at 101½; any investment which would pay 4 per cent. should be at 116, or which would pay 5 per cent. at 145; or 7½ per cent. (that is double of 3½) at 261, to yield the same annual income, which would be £3:9:0 per cent. per annum in each, and would be the same thing as buying an estate at 29 years purchase.

iii. When consols are at 87 and India 5 per cents at 105; what is the difference of the interest that each pay?

5 per cents at 105 pay £4 15 3 per cent. per annum.
 3 " 87 " 3 9 0 "

Difference per cent. £1 6 3

iv. If an estate be offered at 30 years purchase, and it is necessary to sell out consols at 93; how much per cent. is the income improved thereby?

Thirty years purchase is £3 6 8 per cent. per annum.
 Consols at 93 3 4 6 "

Difference per cent. £0 2 2

Any intermediate half years or difference of prices are easily

calculated. The amounts at 6, 7, 7½ per cent. etc., are double those at 3, 3½, 3¾ per cent.; and 2, 2½, 2¾, etc., per cent. are half of 4, 4½, 5, etc. 5½ per cent. is 3 per cent. added to half 4½. Thus, if consols are at 87, 5½ per cent. Bank of England stock should be worth 87, and half 130½; or 87 added to 65½, or 152½; to afford the same rate of annual income, that is, £3:9:0 per cent. per annum.

A. A.

The following table is not usually to be found in works on the subject;

| | | | | |
|--|---|----------|---|-------|
| The 3 per cent. simple interest, doubles itself in 33½ years | | | | |
| 4 | " | compound | " | 23½ " |
| " | " | simple | " | 25 " |
| 5 | " | compound | " | 17½ " |
| " | " | simple | " | 20 " |
| " | " | compound | " | 14½ " |

The 3 per cent. consols

| | | | |
|---|---|-----|----|
| to pay 4 per cent. or 25 years purchase, should be at | | | 75 |
| 5 | " | 20 | 80 |
| 6 | " | 16½ | 80 |

The rate of interest is regulated by the value of money in the market.

SMART, *Tables of Compound Interest and Annuities*, etc., 1736, 1736; SHERIN, *Mathematical Tables on Compound Interest*, 3rd edit., 1741; GADSBY, *Tables on Compound Interest, and on the Value of Annuities*, etc., 1757; BRAND, *Tables on Interest and Annuities*, 1780; BAILY, *Doctrine of Interest and Annuities analytically investigated and explained* (Smart's tables added), 1809; INWOOD, *Tables for the Purchasing of Estates*, (Smart's and other tables reduced), 1st edit. 1811; 16th edit. enlarged 1855; WILKIN, *Popular Tables*, etc., 8vo., 1859, 4th edit.; RANCE, *Table of Compound Interest for every ¼ per cent. from ¼ to 10 per cent. for every year from 1 to 100 years*, 8vo., London, 1852.

INTERFENESTRATION. The space between the windows in a façade when it consists chiefly of them with their decorations. FENESTRATION.

INTERGLYPH. The flat space, called in Latin *femur*, between two glyphs or channels in the decoration, whether a diglyph, triglyph, etc. (supposed to represent the end of a beam) in the frieze of the Doric order. The GLYPH is sunk below this space.

INTERIOR. The name given to the area within the walls and roof of a structure.

INTERIOR OR INTERNAL ANGLE (Fr. *angle rentrant*).

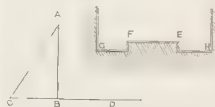
That angle within a triangle in opposition to the angle on the side produced, thus A B C is the interior, and A B D the exterior or exterior angle, of the triangle.

When two lines meet at an angle with each other, an exterior and an interior angle are formed,

the former F F being more usually termed *salient*, and the latter G H being *reentrant*. REENTERING ANGLE.

INTERJOIST (Fr. *entrecou*). The space between two joists. During the mediæval period this space scarcely ever exceeded the width of the joist, which was generally about die square. When 'strength of materials' came to be considered of importance, the space was extended to about twelve inches, the joist being made on an average about 2½ ins. or 3 ins. wide, according to the span. In common work they are too often placed 14 ins. apart even with lessened scantling.

INTERLACING ARCADES. The difference between "interlacing of arcades" and "intersection of arcades" deserves to be noticed. In the church of S. Peter at Oxford are shafts with capitals of Romanesque type, appearing to carry arches springing from each alternate pair and interlacing; that is to say, the complete arch-mold appears to start from the capital on the left-hand, to cross over another arch-mold, and to pass



behind the following arch which also starts from the left-hand. Some arches, on the contrary, pass under the other arch-mold and over the next that starts from the left-hand. Specimens that "interlace" and "intersect" are given *s. v.* INTERSECTING ARCADES.

INTERLACING (Fr. *entrelacement*). The name given in architectural publications of the eighteenth century to the GUILLOCHE ornament, as "interlacings or guilochis" of various kinds, LANGLEY, *Builders' Assistant*, 8vo., 1738, p. 142.

INTERLACING ORNAMENTATION. The intricate patterns formed on articles of metal, stone, and clay, which if not exclusively characteristic of Danish workmanship, are perfectly in accordance with the objects of the 'iron period' found in Scandinavia, and are probably of the tenth century. The singular combination of debased animal forms with interlacings, is of frequent occurrence in Scandinavian ornaments, being the 'drachenzierathen' of northern antiquaries. These types of decorative design, it must be observed, appertain to a widely extended class of monuments, sculptured stones, and other remains, of which a large number exist in Great Britain: the common element of which design might probably be traced to an Asiatic, rather than a Roman origin; ARCHÆOLOGICAL JOURNAL, 8vo., London, 1850, p. 43; WORSAAE, *Account of the Danes, etc., in England, etc.*, 8vo. Lond., 1852. In Bewcastle cross, interlacing ornament is found in conjunction with sculpture of a singularly beautiful and classical character.

INTERLIGNIUM. A mistake in some works for INTERTIGNIUM.

INTERMISSION. An old term for the space between the wall and a pillar, or between one pillar or column and another.

INTERMODILLION (Fr. *entremodillion*). The space between two modillions.

INTERMUTULE. The space between two MUTULES.

INTERNAL ANGLE, see INTERIOR ANGLE.

INTERPENETRATING MOLDING. A molding penetrating some projecting member, and appearing on the other side as if it had passed through it. "Amongst other characters that distinguish the later style of Gothic on the continent from the Perpendicular style in England, there may be observed a much greater and more fanciful intricacy of parts, contrived apparently with a view to display difficulties overcome than beauties of art. Hence the excessive employment of interpenetrating surfaces, especially in the Flamboyant style. In English examples, a molding may sometimes be found to be thus worked, as in the base of one of the turrets at King's College chapel at Cambridge. They are not common in English work, and are confined merely to the interferences of adjacent necessary members of the architectural arrangement. In the FLAMBOYANT style, on the contrary, interpenetration occurs so frequently as to constitute a characteristic; and is produced not merely between two neighbouring architectural members, but new members are also introduced for the mere purpose of showing interpenetrations. Thus two different bases may be given to the same shaft, or even two or more different turrets with pinnacles may be placed in an identical position on the plan, and made to interfere and interpenetrate throughout their entire height from the base upwards in a manner that defies description, and can only be illustrated by drawings." Many examples are given by the author above quoted, WILLIS, *On the Characteristic Interpenetrations, etc.*, in the *Transactions of the Institute of British Architects*, 4to., London, 1842, p. 81-7, and plate. The reader is referred to this, and the many publications on late German and French architecture

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generally, for specimens as curiosities, as it is hardly probable they will be reproduced in modern workmanship. The interpenetration of moldings between the vaulting ribs is a favourite device in the After Gothic of France and Germany. This sometimes occurs in England, as in the chancel of S. Mary, Beverley, as shown by HALL, *Essay on the Origin, etc., of Gothic Arch.*, fol., London, 1813, pl. xxxix. Instances of natural interpenetrations are furnished by the class of compound or twin crystals, as in gray copper, which is called tetrahedrite, and as in staurolite macles.

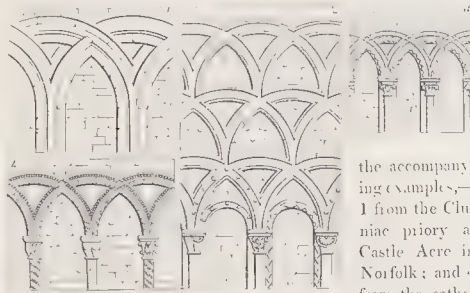
INTERPENSIVUM. This term is used by VIRUVIUS, vi, 3, who, describing the ATRIUM, directs that beams be thrown across, and have *interpensiva* (i. e. *tigna*) that is, suspended beams (in all probability cross timbers) framed into them. HERMOLAUS supposes them to be the same which the Greeks call *κρημαστήρια*. A. A.

INTERPILASTER (Fr. *entrepilastre*.) The space between two pilasters. This distance is regulated by the same rules as those for columns. INTERCOLUMNIATION.

INTERQUARTER. The space between the QUARTERS or STUDS in a partition; it is usually about 3 ft. See INTERTIE for illustration.

INTERRAFTERAGE. A term lately used, as in the ECCLESIOLOGIST *Journal*, 1849, vi, new ser., 155, for the space, between two rafters of a roof, which, when the interior timbers are open to view, is often plastered.

INTERSECTING ARCADES. In some cases moldings do not INTERLACE, but absolutely intersect to stop each other:



the accompanying examples,—1 from the Cluniac priory at Castle Acre in Norfolk; and 4 from the cathedral at Bristol, are rather interlacing than intersecting moldings: but those, 2 from the Cluniac abbey at Wenlock in Shropshire; and 3 from the chapel of S. Joseph at the Benedictine abbey at Glastonbury in Somersetshire, are completely intersecting moldings.

INTERSECTING ARCH TRACERY. The name given to tracery where the mullions simply intersect, leaving plain or foliated spaces in the head. This form is a natural development from the two-light window, according to FREEMAN, *Window Tracery*, 8vo., London, 1851, p. 45, who states that this intersecting arch tracery is perhaps the most common of any, and has enjoyed the memorable distinction of being an especial favourite with churchwardens of the last generation; many elaborate windows having been destroyed (more particularly in Leicestershire) to make way for this cheap substitute, or so mutilated as to be reduced to it. Still it is a genuine ancient form, and one moreover which remained in use during the whole decoration of Gothic tracery; it is only by an inspection of the moldings and other details that the date of individual examples can be fixed with certainty: many examples occur which manifestly synchronize with the latest Perpendicular window. After considering the amount of cusping found in certain examples, and stating that it is not uncommon to find windows of this kind, in which the intersection is not perfect in the head, as in the east window fig. 1 of Blythfield, Staffordshire, the same author, p. 227, commences a long consideration of the interruptions of intersecting

patterns by the characteristics of Third Pointed design. Thus he gives an example at Thaxted, Essex, where the intersecting work, as in fig. 2, is interrupted by a wholly Perpendicular central light. An intersecting design more completely filled up with tracery of that style is to be found in the porch of Hereford cathedral. To this he adds, although rather anomalous, the north windows at Thurlaston, Lincolnshire; and a window at Sheldwich in Kent: and a whole class of windows, some of which are fine, where the head is filled with a series of piercings equally resembling those of an intersecting arch window, while the batement lights below remain purely Perpendicular in style.

INTERSECTIO. A term used by VITRUVIUS, iii, 3, as well as **METOPÉ**, for the space between two dentils. **DENTIL.**

INTERSOLE or **ENTRESOLE.** A word occasionally used in lieu of the French term **ENTRESOL.**

INTERSTICE. The space or distance between any two objects, as a vent, gap, or saw-cut. The word **INTERVAL** has the same meaning, but is perhaps applied more to time and to active operations.

INTERTIE. A short horizontal piece of timber, marked n, used to bind upright posts together, in roofs; in partitions; in lath and plaster work; and in walls with timber framework or brick nogging.

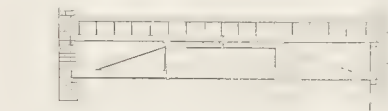


1. 2. The action of it, however, is the reverse of a tie, as it usually struts the uprights or quarters to prevent them bending. In brick nogged work the intertie is sometimes called a *nogging piece* n, and is useful at small heights in allowing the brick courses to take a fresh bearing.

This term is also applied to a method of carrying floors over large rooms instead of girders; and of tying in the external walls of corner houses where any story is used as one large open room. This is done by forming a truss under the floor

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which of course shews in the room beneath, and must be well secured to the plates. This species of intertie is most commonly used where there are large folding-doors, as in drawing-rooms on the first floor of houses. The trusses may be of any kind; if of great width, the lattice truss is best.

INTERTIGNIUM. The space between two rafters or beams. It is the name given by VITRUVIUS, iv, 2, to the metopé; it is one of the proofs that the triglyphs represented the ends of timbers.

INTERTRIGLYPH. The space between two triglyphs in the frieze of the Doric order. It is known as the **METOPÉ**.

INTERVAL between two places; in perspective, see **ANGLE OF INTERVAL.** **INTERSTICE.**

INTERVAL (Fr. *intervalle*). The name for any spaces between objects which are repeated at equal distances in a building, except in the case of **INTERCOLUMNIATIONS**, **INTERDENTILS**, and **METOPES**. Thus there are the intervals between the studs of a partition, the joists of a floor, and the rafters of a roof. The old term *entrecouz* answered to the Fr. *tant plein*

quo vide, while it was usual to make the interval equal to the thickness of the member on either side of it.

INTESTINUM OPUS. This term occurs in VARRO, *De Re Rusticâ*, iii, 1, describing a villa adorned with "opere tectorio (plasterer's work) et intestino et pavimentis nobilibus." VITRUVIUS, iv, 4, directs the spaces between the columns and ante to be filled in "pluteis marmoreis sive ex intestino opere factis." The *pluteus* is supposed to be a sort of enclosure, parapet, or balustrade. In vi, 3, the same author speaks of the 'intestinum opus' as liable to be injured by wet. BALDUS inclines to think this term to mean joiner's work, in which view PRISCUS, *Lex.*, s. v. concurs. As VARRO is describing ceilings and pavements, it is not improbable that by *intestinum opus* he means to intimate 'wainscoting'.

INTONACO, properly **INTONICO**. This term is applied to the whole coating of plastering upon a wall, partition, or ceiling; but properly it means the finishing coat only.

INTRADOS (It. *intrados*; Fr. *double*, and *intrados*; Ger. *innere bogenründung*). The term derived from Italian writers, for the under curved surface of an arch formed by the voussoirs; the upper surface being the *extrados*. It is also called 'soffit'. These terms are all applied to an arch, whatever may be its curve.

INTRAIL, see **ENTRAIL** and **ENTRAYLE**.

INTRASURA and **TRASURA**. These are late Latin terms used in the Rolls of 4 Edward III; "et intrasura super moldas operanti", is usually explained to mean the drawing upon the boards previously to cutting out the moulds for the stone masons. SMITH, *Antiq. of Westm.*, 4to., London, 1807, 181, 182.

INTRITA. A kind of clay, clammy like pitch, used in old time for mortar; and in lamps instead of oil, according to a curious definition in STUART, *Diet*; but it is evidently the word used by PLINY, *H. N.*, xxxv, 49, and xxxvi, 55; where it is the adjective, meaning 'beaten' or 'mixed', with *materia* understood: in the first case he means *clay*, as he is speaking of the manufacture of bricks, but in the second he means *slaked lime*, as he is explaining the method of making mortar. This appears to be the remarkable passage upon which several authors have written about an old law: his words are "intrita, quo vetustior, eo melior: in antiquarum ædium legibus invenitur ne recentiore trimâ uteretur redemptor", where he says "the longer the slaked lime is kept, the better it will be, and in ancient specifications for buildings it was provided that none less than three years old should be used by the contractor."

INVALIDITY. A term applied to cases where contracts become void or invalid. This generally arises, as far as building agreements are concerned, from alterations in the character of the work; or from the employer omitting to fulfil his part of the contract: such, for instance, as not paying instalments when due. To vitiate a contract, it is held that the deviations must not be trivial and unimportant, but must be such as to substantially affect the agreement between the two parties. It is, however, much better that the architect should insert a clause reserving to himself the power with his client's authority, to order in writing any alteration, deviation, etc., from the specification, and provide in what manner and in what time such alteration shall be done, and also how they are to be paid for. If a contract is invalidated by the employer, it is held that the contractor is entitled to be paid by measure and value. A contractor, on the other hand, cannot take advantage of his own wrong, and thereby invalidate his contract. **CONTRACT**; **EXTRA-WORK**; **OMISSION**; **PROVISION**.

INVENTION. The choice and production of such objects as are proper to enter into the composition of a work of art. "Strictly speaking," says Sir J. REYNOLDS, "invention is little more than a new combination of those images which have been previously gathered and deposited in the memory: nothing can come of nothing: he who has laid up no materials can produce no combinations." GWILK, *Encyc.*, adds, "Though

there be nothing new under the sun, yet novelty in art will be attainable till all the combinations of the same things are exhausted, a circumstance that never can come to pass." DESIGN; EDUCATION; IMITATION; INSTRUCTION.

INVERARY GRANITE, see GRANITE, p. 75.

INVERSE. This word means turned inside out, upside down, backward, and the contrary way. In architecture the term generally used is 'invert' or 'inverted'.

INVERT. The term given to the curved bottom of a sewer, being short for 'inverted arch'.

INVERTED ARCH (Fr. *arcade renversée*). An arch turned with its back and keystone downwards, its springing stones serving as abutments to a pier on each side. It is used to a great extent in foundations, where in the superstructure there are large openings, in order to equalize the pressure of the building upon the whole surface of the foundations. In this case the weight is thrown from the piers upon the arch. This system of construction appears to have been introduced in modern times by ALBERTI, to distribute pressure and to prevent the piers forming the chief portion in the lower story of a building from being unequally pressed to one side. It was much used by the Romans in their brick buildings, as at the Pantheon. A DISCHARGING ARCH is one placed over an opening.

INVERTED ARCH BRIDGE, see SUSPENSION BRIDGE.

INVISIBLE GREEN. This tint, so called, is really an OLIVE GREEN, p. 85.

INWARD ANGLE. The re-entrant angle of a solid. INTERIOR ANGLE.

INWOOD (WILLIAM), born about 1771, was the son of Daniel Inwood, bailiff to Lord Mansfield at Caen Wood, Highgate, near London. Having been brought up to the profession, he became steward to Lord Colchester, and surveyor to many persons. He added to the galleries of S. John's church, Westminster, 1821; and designed numerous structures, mansions, villas, barracks, warehouses, etc., besides the buildings in which he was greatly assisted by his two sons, named in the following accounts. He published the well known *Tables for the Purchasing of Estates*, etc., 8vo., Lond., 1811, founded on those of Baily and Smart (INTEREST), and which are called after him; the work reached its 16th edit. in 1855. He died at his house in Upper Seymour-street 16 March 1843, aged about 72 years, and was buried in the family vault in S. Pancras new church. *BUILDER Journal*, ix, 689; xvi, 251. W. Railton was one among his many pupils, who became well known in the profession. 14.

INWOOD (HENRY WILLIAM), F.S.A., eldest son of WILLIAM, was born 22 May 1794. After receiving instruction from his father, he travelled in Greece, examining and drawing 1819 the antiquities at Athens with great care. He assisted his father in designing (after Athenian examples), and superintending, S. Pancras new church, Euston-square, 1 July 1819—7 May 1822; it is faced with Portland stone, and has numerous terra-cotta ornaments by Rossi; it cost £63,251, with about £5,000 for the organ, plate, and other fittings; making a total altogether of £76,679 : 7 : 8. It is 117 ft. long and 60 ft. wide inside, and accommodates 2,500 persons (BRITTON and PUGIN, *Public Edifices*, 8vo., London, 1825, i, 145); the tower is 168 ft. high. He also assisted his father 1822-4 in S. Martin's, or Camden, chapel, Pratt-street, Camden Town, costing £20,000 for 1,300 sittings; 1824-6 in Regent-square chapel, at a cost of £16,000, accommodating 1,830 persons; and 1824-7 Somers Town chapel, Upper Seymour-street. He published *The Erechtheion at Athens; with Marble and Terra-Cotta Fragments of Athenian Architecture, and an Essay, etc.*, fol., London, 1827 (translated into German by QUAST, 8vo. and fol., Potsdam, 1843); and two parts only of *The Resources of Design in the Architecture of Greece, Egypt, and other Countries, obtained by the Studies of the Architects of those Countries from Nature*, 4to., London, 1834. His death is supposed to have occurred

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20 March 1843, about which time a ship in which he had sailed for Spain was wrecked, and all on board perished. The churches are described in the GENTLEMAN'S MAGAZINE, xciv, xcvi, and xcvi.

INWOOD (CHARLES FREDERICK), second son of WILLIAM, was born 28 Nov. 1798, and assisted his father in some of his designs; as the Westminster hospital, Broad Sanctuary, 1832-3, at a cost of £27,500; it is built of grey Suffolk bricks with stone dressings: 174 beds are usually made up, but 230 can be accommodated in the nineteen wards. He erected All Saints' church, Great Marlow, Buckinghamshire, completed 1835; S. Pancras national schools, Southampton-street, Euston-square; and for Mr. Tinkler, the house No. 22, Old Bond-street; *BUILDING NEWS Journal*, iv, 990. He died 1 June 1840, aged nearly 42 years; other accounts say 40 years, which would date his birth in 1799.

IODINE SCARLET. A new pigment, of a peculiarly vivid and beautiful colour, exceeding even the brilliancy of vermilion. It has received several false appellations, but it is truly an iodide or bi-iodide of mercury, varying in degrees of intense redness. It has the body and opacity of vermilion, but should be used with an ivory palette knife, as iron and most metals change it to colours varying from yellow to black. By time alone these colours vanish in a thin wash or glaze, and they attack almost every metallic substance, and some of them even in a dry state. FIELD, *Colouring*, 12mo., London, 1850, and *Chromatography*, 4to., 1835.

IODINE YELLOW. A new pigment of a bright yellow colour, being an ioduret of lead, a precipitate from an acid solution of lead by an alkaline solution of iodine. It must be employed with great caution, as but little experience has been yet gained of its active chemical affinities, and its qualities in painting; FIELD, *Colouring*, 12mo., London, 1850.

IONA (the ancient I-colum-kill, or I-cholum-chille, the isle of Colum of the cell). A village in an island of the same name, one of the inner Hebrides, in the county of Argyre in Scotland. It consists of a row of about forty thatched cottages, skirting the shore, some few modern buildings, and two churches. The island derives its interest and celebrity wholly from the ruined remains of religious establishments of very early and uncertain date. The oldest of the buildings, S. Oran's chapel, is a plain Norman building, but not of the simplest and oldest kind: it may date in the last half of the twelfth century. It is internally 60 ft. long and 22 ft. wide, and roofless; attached to it is the celebrated burying place of some fifty-three monarchs, with other noble and holy personages; the two last Scottish kings being Duncan I. in 1034, and Macbeth in 1040. The gravestones are arranged in nine rows; they are all more or less ornamented, in a style somewhat peculiar to that part of the country, and the design is very varied. No two stones are alike; and in nearly all cases, if the two sides are decorated, there will be a general resemblance between them, notwithstanding that the ornament on one side may be totally different in design from that on the other side. The crosses are a great feature in Iona, and bear a considerable resemblance to those at Monasterboice, co. Louth, in Ireland; three hundred and sixty are said to have existed at the Reformation, but only three or four now remain.

The nunnery chapel, near the town, seems to have been built a few years subsequently (cir. 1200), and has the lighter Norman features predominating, but verging into Pointed architecture. The length is 58 ft., by 20 ft. wide; the east roof is entire, and an aisle exists. The ruins of a detached chapel, and of the nunnery buildings, together with the outline of a quadrangle, can be traced. The gravestone of Anna, the last prioress, is dated 1543. In the cruciform cathedral of S. Mary, the Early English style prevails; while the circular pillars and their decorations are the lingering vestiges of the previous type; the central tower, about 70 ft. in height, and the nave, are Norman work. The great east window, with some

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other adjuncts of the building, are probably not older than the sixteenth century. The length of the transept is 70 ft., and that of the church is 160 ft. by 23 ft. The chapter-house, a dark vaulted chamber with four stalls on each side; the library was probably above it: the ruins of the monastic buildings, the kitchen and dining hall, and one arch of the cloister, are all that now exist. The oldest tomb in this building is that of abbot John M'Kinnon, *ob.* 1500. A small detached chapel exists behind the cathedral; and a little to the north are the remains of what is called the bishop's house. At the entrance to the cathedral on the left side is a small chapel where Columba and his servant are supposed to have been buried. In the fore court are two finely cut crosses formed of single stones of a compact schist or mica slate, 14 ft. in length, 22 ins. broad, and 10 ins. thick. One is called Maclean's; the other, S. Martin's, is 11 ft. in height, on a block of red granite 3 ft. high standing on three steps; it is 18 ins. wide and 6 ins. thick; they are both ornamented on the two sides with carved work, difficult to execute in such a material.

The quoins, tracery, carved capitals, and most of the moldings of this edifice are wrought in sandstone, said to have been brought from Carsaig, near the mouth of Loch Buy on the south side of Mull, where the quarry is still worked. Many of these ornaments are yet sharp, little weathered, and in excellent condition where not wilfully mutilated; others are decayed where the stone has not been originally set on its bed, a precaution especially requisite with sandstone. There is a remarkable diversity of materials used in the walls; the parts usually of 'plain ashlar work' are formed of a very red granite, a streaky dark and light green jade or jasper, a small portion of gneiss, and a black slaty rock, with here and there, apparently a little hornblende or basaltic stone; all these are the produce of Iona itself; a fissile mica slate, used for the roofs, has been imported. These differently coloured materials have been placed so as to contrast with one another; in no instance are two or more blocks of the same material in connection; the whole effect is therefore rich and pleasing, especially as the frequent mists keep the stones almost constantly wet, hence they appear as if polished, and the colours derive a deeper hue. In the construction of the walls, no labour whatever has been bestowed on jointing the coloured stones; 'they are not even 'hammer-dressed', and at present not a trace of mortar can be found in the external beds and joints. The walls are built dry, small fragments being tucked under the stones where required to steady them, but no working has been attempted. Even on the face of the stones, only the largest protuberances have been knocked off. Limestone and fuel to calcine it are both scarce in the western isles, especially at Iona, consequently mortar must always have been expensive there, hence the probable reason of the buildings being almost destitute of that material. These monuments cannot long remain in their present state, unless some careful reparation be soon made to preserve from further dilapidation these truly national mementos of former piety. C. H. SMITH, in *Builder Journal*, 1864, p. 205; BILLINGS, *Baronial, etc., Antiq. of Scotland*, 4to., London, 1848-52, iii; MACCULLOCH, *Highlands and Western Isles of Scotland*, 8vo, 1819; STAFFA AND IONA *Described and Illustrated*, with notices of the principal objects on the route from Port Crinan to Oban, and in the Sound of Mull, 8vo., n. d.; GRAHAM, *Antiquities of Iona*, 1850, gives engravings of the tombs.

IONIC ORDER. This was the richer of the two Orders that, according to VITRUVIUS, iv, 1, were employed by the earlier Greeks. In his time the name was said to be derived from the district called Ionia in Asia Minor; where a colony of Attic Iones who were Pelasgi, intruding upon the Leleges and the Carians, built a temple of the Doric Order to Apollo, and then devised the lighter and richer Ionic Order for a temple to Diana. This tradition suggests that the Ionic Order was really the native style so much modified by the Greeks as

to lose almost all its Asiatic form, and was subsequently borrowed in that condition by those Asiatic neighbours upon ceasing to employ masonry as a close imitation of timber construction. The opinions regarding the expression, by this Order, of an influence arising from Eastern sources might be contradicted by the suggestion that many vases, called Etruscan, exhibit columns with capitals which are so transitional between an exaggerated echinus and a pillow or a cushion as to appear to be merely rough sketches of a voluted capital. The idea, that the Ionic Order is the result of some Pelasgic germ which was preferred by the inhabitants of Etruria, Greece, and Asia Minor, must presuppose that Ionic art was older than that truly Hellenic art (HERODOTUS, i, 56) which is called Doric: it appears, indeed, from PAUSANIAS, vi, 19, that the treasury of Myron built 648 B.C. at Olympia had two chambers; one being treated in a Doric, the other in an Ionic, style. But Khorsabad and Koyunjik, 725-676 B.C., exhibit voluted capitals, which taken in conjunction with the honeysuckle or *PARNETTE* and other features of their bas-reliefs, are evidently the results of an art developed earlier than the Etruscan drawings, and are more nearly related to the Ionic Order of the Greeks than anything furnished by the remains of Persepolis. After observing that in a bas-relief from Khorsabad there is a façade embellished by two columns, the capitals of which closely resemble the Ionic, LAYARD, *Nineweh*, 8vo., London, 1849, ii, 274, notices that "on an ivory tablet from Nimroud, the capitals of pillars, supporting a kind of frame enclosing a head, also nearly resemble the Ionic; but less so than those given in the wood-cut" (upon p. 273 from Khorsabad as above mentioned). "They have, however, the egg and tongue ornament under the *helices*. The lower part of the pine or fir cone, surmounting the columns of wood described in the previous page" (p. 273) "has also much the appearance of the volutes of the Ionic." It has been suggested that the difference in the faces of a pulvinated capital is evidence of the original use of it, as in the above cases, between *antæ* and in no other situation; the employment of it with the balusters outward may be seen in the gateway of the church of S. Saba at Rome, and in the interior of a few other modern buildings where the volutes are made to face each other in a screen of columns. No credence will be given herein to the derivation of the capital of this order from an Egyptian model, or to the statements made in FREEMAN, *History of Architecture*, 8vo., London, 1849, p. 110.

The examples at the Erechtheion at Athens are exceptional in their richness; and, in consequence of the paucity of purely Roman works, it will be convenient to include peculiarities of their detail in the following observations upon those which may be noticed in Greek structures.

The variations in the series of moldings placed at the bottom of the column have been amply described *s.v.* *BASE*; the use of the term *ATTIC BASE* for a particular profile has been admitted by the writers upon architecture from VITRUVIUS (iii, 3) down to the present time.

The *shaft*, which varies in Athenian examples from eight to nine and a half diameters in height, but in Roman ones from eight and a half to nine, is left plain in an Ionic colonnade near the monument of Lysicrates, and in Hadrian's aqueduct at Athens; in a fragment at Segeste; in the theatre of Marcellus at Rome; and in the pattern proposed by Alberti. It is divided for fourteen flutes at Antiphellus; for eighteen in the tomb of Theron at Agrigentum; and for twenty in the temple to Apollo at Basse, in the two columns of the temple to Castor and Pollux at Agrigentum (according to WILKINS, *Magna Græcia*, fol., London, 1807, p. 37), in the heroum of Empedocles at Selinuntum (according to CANINA, *Ant. Etr. Mar.*, pl. 124), as well as in the temple to Fortuna Virilis at Rome. Elsewhere the number twenty-four prevails, conformably to the dictum of VITRUVIUS; but that author, iii, 3, directs that the flutes shall be senicircular, whereas the cases of the destroyed temple of Panops on the Ilissus as well as the propy-

læum and the Erechtheion at Athens, the propylæum and the temple to Minerva at Priene, and the temple at Bassæ, are decided instances, in the Ionic Order, having flutes that approach an elliptical plan and terminate with a similar form; the columns of the proscenium of the theatre at Aizani have the flutes with cables filling one-third of their height. The heroum of Empedocles is shown by CANINA, pl. 124, as having its unfilleted flutes butting against a plain band below the capital, like those in the tomb of Theron, and in a tomb at Antiphellus. Notice should also be taken of the vases which fill the heads of the flutes to the columns of the temple to Jupiter at Aizani: and of the remarkable use of a piece of beading left on the upper part of the fillets between the flutes of columns at the eastern end of the Erechtheion. FILLET; FLUTE.

The *frieze* or *necking*, below the capital at the latter building, and the ornament under the ovolo in the capital of the columns of the proscenium at Aizani, seem to be exceptional in Asiatic or in Greek work; but something similar may be seen in antique capitals at Rome, e.g. in the churches of Sta. Frassede, S. Niccolo in Carcere, Sta. Maria in Trastevere, and S. Giorgio in Velabro, and in the casa Paribeni, as well as at the villas Albani and Altieri: a similar fragment found near Florence suggested to G. Giamberti da San Gallo the capital which he used about 1479 in the cloister of the monastery of Sta. Maddalena de' Pazzi in that city. As regards the actual horizontal *jointing* of the masonry at the capital, it seems evident, from the shafts at Didyma, and in the propylæum at Athens, and from the Lycian tomb in the British Museum, as well as from all the fragments above mentioned (except in the casa Paribeni) at Rome, that generally the astragal, and consequently the apothesis, belonged to the shaft; these Roman examples also show that when the shaft had a necking of any sort, there was a joint below the ornament: at Aphrodisias a joint occurs just below the termination of the flutes, which would be very useful when the volute is so deep as in that instance; the joint at Bassæ was level with the bottom of the volute. But the joint occurring at the top of the ovolo may be seen in the capital from the temple to Artemisia Eucleia; and over the necking (which belongs to the shaft) of the column from the Erechtheion, both examples being in the British Museum. In both these cases the volutes must have been worked out of a separate block; at the Erechtheion a thin slab worked as a guilloche seems to have been inserted so as to raise the voluted block: the ovolo could thus be seen worked under the volutes. It was supposed by INWOOD that the stoppage of the enriched ovolo between the volutes may be the oldest method of working the capital; it occurs in the ruins at Sardes, in one building at Eleusis, in Hadrian's aqueduct at Athens, and in the temple to Fortuna Virilis; but the ovolo is continued all round the capital in the temple at Samos, in that at Didyma, in the propylæum and the temple at Priene, in the inner propylæum at Eleusis, in the temple to Panops, and in the Erechtheion.

The essential feature of the capital is the HORN or VOLUTE: and it has even been suggested that eight volutes originally formed the design; or at least were so usual in the time of VITRUVIUS, as to cause him, in speaking of the capitals, to say "*si pulvinata erunt*": here clearly meaning "if the sides be cushioned": no other conjecture can be safely formed; for if the expression "*si non pulvinata erunt*" had occurred, it could only have been explained by reference to a capital like that in the temple at Bassæ. Another portion of the capital appears to have been considered essential, viz., the ovolo between the volutes: this, however, is absent in tombs at Antiphellus and at Telmissus, and in one or two examples that are of little importance otherwise at Rome; the extraordinary length of the tongues between the eggs at Aphrodisias is remarkable. Another feature, also so frequent as to seem to have been essential, is the PALMETTE which, springing from the return of the volute upon itself, covers the junction of the ovolo with the volute: it is not seen in a tomb at Antiphellus,

Myra, and Telmissus, nor in the Erechtheion (where it might possibly have been made of metal), nor perhaps in six of the examples above cited in the churches and villas of Rome; it is worked like a leaf from the usual point, in the Ionic colonnade at Athens; but this leaf starts from the bottom of the ovolo in the tomb of Theron, like the series of husks in the capital of the peristyle to the basilica at Pompeii, as shown in DONALDSON and COCKBURN, *Pompeii*, fol., London, 1827, p. 54.

Groups may be formed, from the remains of classic works, by observing the treatment of the line which connects the opposite returns of the volute upon itself: this is a straight line formed by the top of the ovolo or parallel with it, in the example at Aphrodisias, in the structures at Aizani, and in the propylæum at Priene, the temple at Didyma, Hadrian's aqueduct, the temple to Fortuna Virilis, the theatre of Marcellus, the baths of Diocletian, and the fragments above named in the churches and villas at Rome. It is almost a single wavy line in a tomb at Antiphellus, and in the temple at Bassæ; but is a distinct wavy fringe or hem, to the apron or curtain (wrongly termed cymatium by INWOOD) between the abacus and the ovolo, in the capitals of the temple to Panops and the temple at Priene, and in two examples at Eleusis. Three such wavy lines occur at the Erechtheion. This apron was sometimes an object of decoration among the Greeks, as at Sardes, and in a capital given by INWOOD, pl. 24-5; in a tomb at Antiphellus the *palmette* thus used has been placed upon the astragal; and forms between the volutes, a central mass of ornament: these three with another in the cloister of S. Paolo at Rome, suggest a series of more admirable variations from the usual type than the ornament that on the right and left curls into tendrils. This is a short description of a class which has been noticed at Sardes and at Aizani, and in several of the examples above named in the churches and villas at Rome; in at least eight of these last instances the scroll of the volute is accompanied by foliage which sometimes seems to be merely the development of the husk of the palmette.

With regard to the flanks of the volutes, it may be noticed that there are two distinct modes of working the sides; one shows in elevation a nearly straight line under the abacus, whatever may be the bottom curve, and this is a *cushion*; the other has the upper line and the bottom curve more or less correspondent, and this is a *baluster*. It has been suggested by INWOOD that, where the ovolo is stopped by the volutes, a particular form of side elevation for the baluster was designed, so that there might be a curve just below the abacus corresponding to the curve between the backs of the volutes: and he urges this so strongly as to say that only in the Erechtheion and in the inner propylæum at Eleusis, does it appear "that the form of the return side of the volutes of the Ionic capitals was preserved to nearly a straight line under the abacus above;" he might have added the temple to Fortuna Virilis, and the baths of Diocletian. This point, however, does not seem of much importance where the ovolo could be contained in the cushion or baluster; especially if the horizontal joint be above the ovolo. The decoration of the *cushion* generally consisted of channels between beads, such as the nine hollows at the Erechtheion, and five in the temple to Panops, with those at the inner propylæum at Eleusis. This notion was adopted by most of the Italian masters; but the leaved cushion, seen in the temple to Fortuna Virilis and in the baths of Diocletian, was followed by Palladio. The decoration of the *baluster* also consisted in several cases of channels between beads, such as the five hollows in a capital found among the ruins at Eleusis, and the three of the *antæ* in the temple at Didyma, which are plain; but the centre one is ornamented in the capitals of the columns of the temple at Priene and of the temple at Didyma: the baluster is covered with foliage in the inner propylæum at Eleusis; and consists entirely of foliage in the examples afforded by the temple at Aizani, Hadrian's aqueduct, the theatre of Marcellus, and the *antæ* in the propylæum at Priene. The external fillet is dou-

bled on the side front in the Erechtheion, in the temple and propylæum at Priene, in the columns and ante of the temple at Didyma, in the temple to Fortuna Virilis, and in the theatre of Marcellus, wherefore it was hollowed by Palladio and Scamozzi. The remarkable case of two voluted capitals conjoined under one abacus, as shown in STUART and REVETT, *Antiquities*, fol., London, 1827, iii, in a vignette, deserves attention. AXIS.

The supposed necessity for uniformity in the sides of a capital placed at the external corner of an entablature is usually advanced as the reason for the angular plan of the capitals found in the temple at Aizani and at Priene, in that to Panops, as well as in the Erechtheion, and in the temple to Fortuna Virilis. But at Bassæ the attempt at a capital with four similar faces is worked with an amount of dexterity, in altering the widths of the faces and in working to a false centre, which almost forbids the notion that it was either unique, or the first of its kind. The capital designed, on a hint taken from the temple to Concord or Vespasian at Rome, by Scamozzi, has more affinity in principle to the fragment found at Segeste than to the Roman example: but he borrowed the leaf, that lays as a strap outside the volute, from the latter; unless, indeed, his design was also founded on the capitals at the churches of S. Clemente and S. Niccolo in Carcere, and at the villa Altieri: the same strap-leaf occurs in the theatre at Aizani. ANGLE CAPITAL; ANGULAR CAPITAL. The leaf under the angular capitals of the eastern portico of the Erechtheion, and another from a fragment given by INWOOD, pl. 29, p. 145, seem to have generally escaped observation. Another capital with eight volutes has also been found at Pompeii, upon a Doric shaft like that of the heroum of Empedocles. The difference of the Attic and Ionian ante capitals is shown *s. v.* ANTA.

The management of the *spiral line*, the sections of it and the surfaces which it bounds, the decoration of those surfaces with foliage, and the management of the eye, will be better considered *s. v.* VOLUTE.

The *abacus*, which seems to have been omitted at Bassæ, is a plain ovolo in the temple on the Ilissus, and in the inner propylæ at Eleusis: it has also a fillet in the example found in the ruins at Eleusis, and in Hadrian's aqueduct. An enriched ovolo without a fillet occurs in the temple at Didyma, and in the Erechtheion; in the latter instance there is also a plain bead. An enriched ovolo with a fillet occurs in the temple at Aizani. A plain oggee with a fillet, seen in the temple to Fortuna Virilis, and in the theatre of Marcellus, was adopted by Serlio and Alberti. An enriched oggee without a fillet occurs in the temple at Priene: but the oggee has a fillet in the propylæum there; in the proscenium at Aizani; and in the baths of Diocletian, which last example was followed in this respect by Palladio, Scamozzi, and Vignola. In all these cases the abacus is square, except in the four-faced capital by Scamozzi, who making the abacus with a curved plan, truncates the consequent horns, almost as if he had copied the remarkable examples in the tomb of Theron, or in the proscenium at Aizani.

The average of six examples of the height of the *entablature* makes it four and a half modules. Amongst the irregularities in this order is the use of a Doric entablature; the instances named by HITTORFF, *Restitution*, 4to., Paris, 1851, pl. 17, p. 780, include the tomb of Theron and the oratory of Phalaris at Agrigentum; the heroum of Empedocles on the acropolis at Selinus; and the tomb of Absalom at Jerusalem. The *architrave* possesses a single fascia in the temple to Panops, and in the tomb already mentioned at Antiphellus. It has two fascias in a tomb at Telmissus, in the temple at Bassæ, and in the aqueduct of Hadrian: elsewhere three fascias seem to be the rule. The projection of the architrave varies in nine examples from 25 to 33 minutes; the average 28 occurs at the temple to Panops. The *frieze*, which is wanting in examples at Antiphellus, Myra, and Telmissus, is pulvinated in the baths of

Diocletian. The upright face was decorated with figures in the temple at Bassæ, and to Panops; with representations of animals on part of the proscenium at Aizani; with beautiful ornaments in the temple at the same place; and with swags of foliage supported by boys in the temple to Fortuna Virilis (this has been stated to be a subsequent addition worked in cement): as it is known that the Erechtheion had a frieze of the leaden or slaty coloured marble quarried at Eleusis, with holes indicating that sculpture had been attached, it may be inferred that the practice was also sometimes adopted elsewhere. Assuming that the cymatium or bedmold in the cornice belongs to the frieze, its height in terms of the architrave is about seven-ninths in the temple, (but eleven-thirteenths in the propylæum), at Priene; rather less than equal height in the baths of Diocletian and in the pattern designed by Serlio; equal in the temple to Panops and that to Fortuna Virilis; rather more than equal in the ruin at Eleusis, in the Erechtheion, and in the theatre at Marcellus, as well as in the design by Palladio; and nearly double the height of the architrave at Bassæ. The upright face at Bassæ is $57\frac{1}{2}$, but at the Erechtheion $48\frac{1}{2}$; and at the temple to Panops 49; at Eleusis 41; at Priene 37 in the temple, and 28 in the propylæum; at the theatre of Marcellus $36\frac{1}{2}$; at the temple of Fortuna Virilis $28\frac{1}{2}$; and at the baths of Diocletian 28, parts of the module.

If the *cornice* be allowed to include the cymatium of the frieze, it will be found in the temple on the Ilissus, in the Erechtheion, and at Bassæ, as in the design by Alberti, to consist of a cyma, corona, and bedmold, without any dentils; yet modillions occur in two buildings at Aizani, and were introduced in their designs by Palladio and Scamozzi; but dentils have been usually employed in consequence of the dicta of VITRUVIUS, iv, 1 and 2, as the mark of an Ionic cornice, especially whenever it occurs without modillions. Varieties of treatment of the interdentils will be found in the *Illustrations*, *s. v.* DENTIL.

There are two features in the entablature upon which the modern masters do not appear to have regarded the dicta of VITRUVIUS, iii, 1; where he orders that the frieze shall be a quarter higher if sculptured, a quarter lower if plain, than the architrave; and that the height of the architrave itself shall depend upon that of the column.

Examples of the use of the Ionic entablature with Corinthian capitals are found in the monument of Lysicrates and the horologium at Athens, the temple to Vesta near Tivoli, that to Antoninus and Faustina at Rome (both with the dentil band uncut, which is the case in the design by Serlio), in the portico of Octavia at Rome, in the arch of Hadrian at Athens, and in the temple at Euromus (now Jackly) near Mylassa.

The chief works affording illustrations of this subject are PIRANESI, *De Romanorum Magnif.*, fol., Rome, 1761; INWOOD, *Erechtheion*, fol., London, 1827, which contains one of the largest drawings of the details of a capital that have yet been published; TEXIER, *Asie Mineure*, fol., Paris, 1839; NORMAND, *Parallel*, fol., London, 1829, and MAUCH, *Neue System. Darstellung*, 4to., Potsdam, 1845; these last named publications, exhibit the profiles of the chief ancient and modern varieties, but unfortunately do not always specify the sources from which they have been drawn, except in the case of the designs made by the early Italian architects; Sir W. CHAMBERS, *Civil Arch.*, etc., must be added. Reference may also be made to GHISI, *Gli oscuri et difficili passi dell' opera Ionica di Vitruvio*, fol., Mantua, 1558; to GUHL, *Versuch über das Ionische Kapitael*, 4to., Berlin, 1845; and to DALY, *Revue Générale*, 4to., Paris, 1858, xvi, 146. It is worth while to compare the capitals of the pilasters to the temple at Aizani with those of the arch of Hadrian at Athens. It must be remembered that some buildings named in this article no longer exist except in books.

IPSAMBUL or YRSAMBUL, see ABOO-SIMBEL, in Egypt.
IRIDESCENCE, see GLASS, p. 48.

IRISH ARCHITECTURE. The ancient architecture of Ireland presents features not only peculiar, but also entirely distinct from those of other European nations. Insular position, and consequent immunity from foreign interference until the English invasion, A.D. 1152 (the Danes left only traces of their temporary military occupation in isolated localities), allowed the Irish to cultivate and perpetuate, to at least the eleventh century, a style peculiar to themselves, as well as uninfluenced by any foreign element.

Their earliest known constructions in stone are the chambers and passages of tumuli, and the fortifications called *CASHELS* or *DUNs*. Some of the tumuli are of great size, as at New Grange, Dowth, and Knowth. They contain chambers of uncemented masonry, domed after the manner of the Grecian examples at Mycenæ and Orchomenus, but of ruder workmanship. Long passages covered with slabs of stone lead to the chambers. Similar constructions are also found in the numerous stone and earthen forts called *RATH*, *LIOS*, and *CATHAIR*, spread by hundreds over the face of the country; of which Staigue fort, near Kenmare, co. Kerry, is a good type. It is 88 ft. in diameter internally; the wall of uncemented rubble masonry, is 13 ft. 5 ins. thick at the door level, 18 ft. high, capped by a projecting eave, and having a batter of 2 ft. 7 ins. on the external face. Internally the wall has ten flights of steps leading to the parapet, and crossing each other in the form of the letter X. The entrance doorway, 4 ft. 6 ins. wide, has a flat head and converging jambs. Chambers are formed in the thickness of the wall, which is surrounded by a ditch 26 ft. wide. The stones are flat and thin, but fitted together with the greatest care and nicety. Other remarkable fortresses are, Dun Aenghus on Arranmore, at the entrance of Galway Bay, as also the fort of *ATLECH*, co. Londonderry; the latter place is identified as the seat of the kings of Ulster several hundred years before the Christian era; its demolition is mentioned by the *FOUR MASTERS* at A.D. 674. The *cashel* called *cathair Mac Lir*, co. Cork, is a fine specimen of uncemented masonry in its gateway, where the wall is 17 ft. thick; the sides of the entrance passage are faced with dressed stones accurately fitted, with horizontal beds, and the joints, both perpendicular and raking, are exceedingly close; the sides of the passage converge, and support a covering of large slabs.

Another primitive class of buildings is called *CLOCHANS*. They are usually circular on plan, from 9 to 20 ft. in diameter internally, the wall of uncemented masonry from 4 to 8 ft. thick, with a rude dome of stone on the overlaid principle; the entrance has always a horizontal head and inclined jambs. Though usually circular, some are square, elliptical, quadrantal, or analogous in form to the vesica piscis. These buildings, supposed to have been either storehouses or habitations, are principally found in the west of the counties of Cork, Kerry, Clare, Galway, and Mayo. *GOBAN.*

The round towers have been claimed by contending schools of antiquaries either as Pagan or Christian structures. The peculiarities of style and construction, the difficulty of assigning the use, and the absence of all historical evidence as to their origin and era, have given wide scope for conjecture and theory; which have hitherto, however, left the vexed question undetermined. They are circular structures varying from 7 to 9 ft. internal diameter; the walls from 3 ft. 6 ins. to 5 ft. in thickness at the base; the height from 70 ft. to 110 ft. Several examples afford evidence that they were finished with a conical roof or spirelet, springing from projecting eaves, and formed of stones overlapping each other. The doorways, which are generally flat-headed, but sometimes semicircular, are placed at the height of from 6 ft. to 20 ft. from the ground. The windows are small, generally flat-headed, though sometimes angular, and sometimes semicircular. The oldest and most perfect examples have four windows immediately under the eaves, facing the cardinal points, or nearly so. As a rule, however, all the openings have the jambs converging upwards

like those in the stone forts, clochans, etc. All the towers are built of cemented masonry; but the character of the workmanship varies in different examples, from the coarsest spawled rubble, to the finest and most closely jointed ashlar work. The same severe archaic type of architecture prevails throughout the details of all the existing towers, with the exception of the doorways at Kildare and at Timahoe, which various writers have declared to be insertions of a Romanesque character. **ROUND TOWER.**

The ecclesiastical architecture may be divided into two periods, the primitive and mediæval. When the inhabitants were converted to Christianity by the native missionaries, they followed, in the erection of their churches, the ordinary style and mode of construction; and it was not until the lapse of several centuries, when defined styles sprang up in France and Germany, and intercourse grew frequent between the Irish and continental churches, that Romanesque details were introduced. The primitive churches are small and simple rectangular buildings, varying in size from 12 ft. by 8 ft. to 40 ft. by 25 ft., examples of the larger dimensions being very rare; the walls, from 3 ft. to 4 ft. in thickness, seldom exceeded 14 ft. in height to the eaves; the side walls usually projected from 18 ins. to 2 ft. beyond the gables at either end, in the manner of the classic *antæ*. Many existing examples of these buildings are roofed with stone, very highly pitched, with overlapping courses. Examples occur in the churches of S. Flannan and S. Molua, at Killaloe; in Cormac's chapel at *CASHEL*; in S. Kevin's kitchen at Glendaloch; in S. Columb's church at Kells, etc. The entrances, always at the west end, have inclined jambs, and either semicircular, or more usually flat, heads. The windows, which are few and very small, with large inward splays, follow exactly the type of the openings in the round towers. There is always an opening in the east end, but not larger than the others, and the orientation of the building is generally carefully preserved.

The masonry varies according to the locality and the nature of the materials. Generally it is of a superior class of rubble work, the stones sometimes spawled, sometimes dressed to fit each other, though not in courses; in many cases it is of a polygonal character. The use of large material was preferred; the side wall of a church in Arranmore, consists of eleven stones, one being 16 ft. in length; and this is not a solitary example. A proof of the great antiquity of these structures, is the entire absence of decorative forms and detail, even of the simplest molding or chamfer.

It is difficult to determine the precise period when chancels were introduced into churches in Ireland. Many of these early churches still remain without them; some have this feature as an addition; in others the small church or oratory has been formed into one, and a nave added; a process to be seen in actual progress in S. Molua's church, on Friar's island, near Killaloe. An attempt at decoration appears at a later period, the old forms being preserved, the openings are ornamented on the external arrises with a torus between two hollows. It has been erroneously stated that no decorated architecture existed in Ireland before the English invasion, A.D. 1152; but in fact three centuries previously, ornamental forms and sculptured decorations prevailed in the numerous sepulchral slabs, and on the richly adorned monumental crosses, whose inscriptions testify their era; the precise period, however, at which carved ornament began to be used in the details of Irish churches has not as yet been ascertained. While there are a number of large monastic churches, unmistakably of Norman type, founded in the half century preceding the English invasion, there are also scattered through the country, in remote districts not under English rule for some centuries, many small churches presenting details of a highly ornamented character, and of rather a Byzantine type, in which those found on the crosses, and the decorative forms of illuminated MSS. are introduced, such as interlaced strap work, entwining serpents,

snakes devouring human heads, the Greek fret, the guilloche, and other forms. It is, however, probable that these works were executed by native architects or builders; for while Byzantine and Romanesque details are introduced, the ancient form of their door and window openings are still preserved, the converging jambs being found in the Romanesque doorways of S. Flannan's church at Killaloe; in the church on White island, Lough Erne; in Kilmalkedar church, co. Kerry, and others. That the richly ornamented church porch at Freshford, co. Kilkenny, is of native design, is proved by the inscription on the arch. Cormac's chapel at CASHEL, a well known example, was commenced A.D. 1127, and consecrated A.D. 1134; with details derived from foreign sources, is combined much native feeling; the stone roof, and many other features, are of a decided Irish type.

In the early part of the twelfth century, a new era in ecclesiastical architecture was inaugurated by the introduction of the CISTERCIAN ORDER of monks. Strength, convenience, and a chaste but rather severe elegance, seem to have been the objects aimed at in their buildings; these, indeed, are the distinctive features of the establishments of this order in Ireland, where its followers appear to have settled about 1142; and between that period and the commencement of the thirteenth century, to have erected no less than twenty-four extensive monasteries, several of which are still in existence, but more or less in ruin. They were principally erected in the Norman style; great attention being as usual paid to the church, which varies from 160 to 200 ft. in length, and consists of a long nave with aisles, transepts, and a chancel; and at the east side of each transept—one or more small chapels. The chancel is remarkably short, seldom exceeding one-seventh of the entire length of the church: a low massive central tower is the only one introduced. The moldings are remarkably simple and effective; the piers and pillars had capitals enriched with sculpture; in those of the abbey church of Boyle, the human figure is introduced habited in the native costume. That the roofs were vaulted, is evident from the remains of the rib-springers resting on corbels between the nave arches at Boyle, Dunbrody, and Ballintobber. The vaulting over the chancels and chapels of Boyle, Ballintobber, and Monaster-nagh, are still perfect. Remains exist of the following Cistercian churches:—Boyle, founded A.D. 1148; Mellifont, 1142; Bective, 1148; Jerpoint, 1180; Dunbrody, 1182; Knockmoy, 1190; Monaster Nenagh, 1148; and Corcumroe, 1194. Examples of eleventh and twelfth century work may be seen in the cathedrals of Killaloe, Tuam, and Clonfert; also in the churches of Killeslin, Rahin, Kilmalkedar, Cong, Disert, Tomgrany, the nuns' church at Clonmacnoise, and Monaincha; of early eleventh century work, in the church of S. Camin, Iniscaltra, and Freshford, co. Kilkenny.

It was not until the commencement of the thirteenth century that the arts of England began to have any marked influence on those of Ireland, which had been invaded in 1152, by bands of Norman adventurers under Raymond le Gros, Strongbow, and others, and from that date to the close of the twelfth century, extensive castles were built by the Normans, at Lismore, Ardfinnan, Nenagh, Roscommon, Kilkenny, Kilkea, Carlingford, and Ardee, while some monasteries were founded by the Norman barons, as also by native chiefs. But in the thirteenth century, the Normans having obtained a permanent footing, turned their attention to the improvement of their estates, the erection of walled towns, churches, and monasteries. Their efforts were aided by a considerable influx both of English and foreign ecclesiastics of various orders, who, under the protection of the Normans seized the possessions of the Irish orders, and the livings of the native clergy. A vast number of religious houses and castles were accordingly erected, particularly in that portion of the country called the "English pale", which enjoyed some immunity from the inroads of the natives. Neither the monasteries nor the churches can how-

ever compare in size or architectural magnificence with similar establishments in England and on the continent. The churches though strictly following the style then prevailing in England, are deficient in elaborate moldings and sculptured decoration, except in some rare instances. During the subsequent distracted state of the country which continued for centuries, such numbers of ecclesiastical edifices were destroyed, that it is now difficult to form a correct opinion of the architecture of those buildings from the few, and those mutilated, remains now standing. Many of the Cistercian churches commenced in the eleventh, were completed in this, the twelfth century. The chancels at Boyle and Monaster-nagh are finished in the First Pointed style, as also are many parts at Jerpoint and Dunbrody. Almost all the establishments erected by the religious orders, both in this and the succeeding century, were on nearly the same plan. The church lay to the south, the domestic buildings to the north, surrounding a small cloister court. The church is usually from 150 to 200 ft. in extreme length, consisting of a nave, generally without aisles, a chancel, and a tower raised on heavy piers, between the nave and chancel. The nave has sometimes a short aisle at the south, and very generally a chapel or transept, opening to the nave by one or two arches. The arches of the central tower are very narrow; in some instances not wider than a good sized doorway. The central tower is a peculiar feature in the church architecture of Ireland; it is generally rectangular on plan, but sometimes square, of slight dimensions, varying in height from 60 to 100 ft., and divided into three, or more stages by molded, or chamfered string courses. It is without buttresses, and exceedingly plain in detail, never exhibiting the rich panneling, open work parapets, and ornamental angle pinnacles, seen in England. The tower is finished with a parapet, which has crenellation of a character peculiarly Irish. Examples of thirteenth century work will be found in the following edifices:—S. Patrick's cathedral and Christ church, Dublin; the cathedrals of Kilkenny, Killaloe, Kildare, Limerick, and Cashel; the abbey churches of Ennis, co. Clare; Roserick, co. Mayo; S. John's, co. Kilkenny; Graigue-nemanach, co. Kilkenny; Kilmallock, co. Limerick; Knockmoy, co. Galway; Corcumroe, co. Clare; Buttevant and Ballybeg, co. Cork; and in the parish churches of Gowran, co. Kilkenny; and Youghal, co. Cork. The only existing lady chapel is that of S. Patrick's cathedral, Dublin, which was much altered during its restorations by R. C. Carpenter. Vaulting, of this date, is seen in the chancel of S. Patrick's cathedral, Dublin, and in the chancels of the abbey churches of Ballintobber; Boyle; and Monaster-nagh.

During the fourteenth century a number of religious houses were erected, and alterations and additions made to others then existing. No difference of style is found in the details of the buildings then erected in England and Ireland: the same moldings, decorations, and window tracery are observable, the main difference consisting in the less pretentious character of the Irish buildings, and the deficiency of elaborate sculptured decoration. Three octagonal church towers may be referred to this period; at the parish church of Clonmel; at the parish church of Askeaton; and at the abbey church of Tristernagh, Westmeath, some time since destroyed. No mediæval spire is known to exist in Ireland. Two Cistercian churches were erected during this century; one at Holy-cross, and one at Kilcooly, both in co. Tipperary. The former contains some very interesting details; the groining of the tower, chancel transepts, and side chapels which is perfect; an elaborately finished sedilia, and a curious monument usually called the shrine. Kilcooly has a very fine decorated window and other good details. Fourteenth century work will be found in the following churches:—Clonmines, co. Wexford; Clonshanvill, co. Roscommon; Portumna, co. Galway; Quin, and Ennis, co. Clare; Sligo, co. Galway; Black Abbey, co. Kilkenny; and Mulfernán, co. Meath; Clonmel, co. Tipperary; Askeaton abbey, co. Limerick; and the chancel at

Youghal, co. Cork. During this century also, vast numbers of castles were erected by the Anglo-Irish barons, who covered their respective territories with these defensive structures, many of which still exist but demand no special description on account of their non-architectural character.

The Irish architecture of the fifteenth century has no features in common with the perpendicular of England, or the flamboyant of France. Of the mediæval styles it has the most distinctive national features, if the plentiful use of the flat-headed Tudor window in the castles and small parish churches in Ireland be excepted. The Franciscans of the second and third Orders erected the principal houses at this period; of these considerable remains exist at Athenry and Kilconnel, co. Galway; Roserick and Moyne, co. Mayo; Court, co. Sligo; Sherkin, co. Cork; Mucrus and Lisachin, co. Kerry; Donegal, co. Donegal; Kilcrea and Timoleague, co. Cork; and Adare, co. Limerick. The Dominicans built Kilcarvan, co. Galway; Orlare, co. Mayo; and Tusk, co. Roscommon. The Augustines built Dunmore, co. Galway; and Bannada, co. Sligo. In these erections, although there is no perceptible difference as regards plan and arrangement from those of the preceding era, there is a very apparent falling off in the character of the architecture. Chamfers supersede moldings, and where the latter are used, the members are few and shallow; there is almost an entire absence of carving, as also of the upright panelling; the church windows have no resemblance to those of England; there are no transoms; the mullions rising to the springing of the arch, intersect in simple curves, without cusplings; examples are found in the friary churches of Adare, Askeaton, Quin, and Mucrus. These windows are generally well proportioned, and though plain and simple in detail, are good in effect. A distinguishing feature in the monastic edifices are the cloisters, which have a remarkably foreign and southern aspect. The cloister court, usually placed on the north side, opens by a doorway into the church under the central tower. The proportions are rather of a miniature character, the court never exceeding 45 ft. square, and the ambulatory 9 ft. in width. The court of the Franciscan friary at Adare is 34 ft. square, the ambulatory 6 ft. 9 ins. wide; at Askeaton the court is 33 ft. square, the ambulatory 7 ft. wide. The court is divided from the ambulatories by arches and pillars, resting on a sole of solid masonry, and divided into bays each of two or three arches, each bay separated by a buttressed pier. The pillars are usually circular or octagonal, and have, in some instances, a spiral fluting. The ambulatories have generally a lean-to roof, but in some instances, as at Ardferit and Quin, the domestic apartments are situated over them, an external wall being raised over the arcades; the best examples are found at Adare and Askeaton, co. Limerick; Quin, co. Clare; and Sligo. The remains of the cloisters of Boyle, Holycross, Dunbrody and other Cistercian abbeys are of much larger dimensions, but there are no traces of their arcades. In some of the churches of this period, a two-light window with a horizontal head is seen in the north and south walls.

A great number of parish churches were erected throughout the country in this century. They are usually rectangular buildings of small dimensions; with a two-light flat-headed window in the east gable, similar windows in the flank walls, a south doorway, and a plain bell-cot on the west gable. A chancel screen either of wood or stone in Ireland is unknown to the writer. The only example of an ancient timber roof is at Youghal church—it is a good specimen of a thirteenth century oak roof. No portions of any ancient stained glass remain, though it was not uncommon, and fragments have been found in the ruins of churches. It is a matter of history that bishop Ledrede filled the great east window of S. Canice cathedral, Kilkenny, with stained glass, which was in existence in 1690.

It must be borne in mind, in the examination of Irish build-
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ings, that though the pointed styles in Ireland followed those of England, each style in the former country was not confined to the particular century, but was frequently continued in the next. From a close examination of a considerable number of ancient buildings it is evident that the best periods of Irish architecture are the twelfth and the fourteenth centuries.

The *crannoges* or lake castles, and early dwellings of the Irish, by M. D. WYATT, read before the Institute of Brit. Archs., January 1858; and a short notice of one in the *BUILDER Journal*, 1864, xxii, 282. At the same society was read by DONALDSON, *Wayside Memoranda during a Tour*, 26 April 1858; by PETIT, *Abbeys of Ireland*, March 1863; and HILLS, *Review of the Arch. and Hist. of Round Towers*, Jan. 1858. DU NOYER, *Some Peculiarities in Ancient and Mediæval Irish Eccles. Arch.*, in *Transactions of the Kilkenny Archæological Society*, also given in *BUILDER Journal*, 1864, xxii, 492-4. ARCHDALL, *Monasticon Hibernicum*, 4to., Lond., 1786; WARE, *Antiq. of Ireland*, etc., by HARRIS, fol., 1739-64; ALEMANT, *Histoire Monastique d'Irlande*, 12mo., Paris, 1690; are the best authorities; LEDWICH, *Antiquities*, 4to., Dublin, 1789, and 8vo., 1804; WAKEMAN, *Handbook to Irish Antiq.*, 12mo., Dublin, 1848; GROSE, *Antiquities of Ireland*, 4to., London, 1791; NEWENHAM, *Picturesque Antiquities of Ireland*, 4to., London, 1830; PÉTRIE, *Ecclesiastical Architecture of Ireland anterior to the Norman Invasion*, 2nd edit., 8vo., Dublin, 1845; WILKINSON, *Practical Geology and Ancient Architecture of Ireland*, 8vo., London, 1845; GRAVES and PRIM, *History, etc., of S. Canice Cathedral, Kilkenny*, 4to., Dublin, 1857; *ULSTER JOURNAL OF ARCHÆOLOGY*; and the *GENTLEMAN'S MAGAZINE* for 1863, 1861 and 1865.

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The peels, towers, or castles, which were the only important civil dwellings erected until the sixteenth and seventeenth centuries, were the precursors of civil architecture in Ireland. Perhaps the domestic buildings of the fifteenth century and the three-storied abbatial residence of the sixteenth at Ross abbey, co. Galway, may be taken to represent the point of junction between the Pointed and the Renaissance periods, to which may be added Canturk, and later Drumanee, near Mallow, co. Cork; Donegal castle; Loughmore castle, co. Tipperary, except the keep; and, with the same exception, Blarney castle, co. Cork, if the usual assertion that the later portion was built after 1689 be incorrect; Ballyvourney court, near Cork, unfinished; Fanstown castle, and the neighbouring town of Kilmallock; Ballinagheagh castle, and (later) Strangford castle, near Athenry; and the town of Galway; Aughnacore castle, co. Galway; Ballygruffan castle, near Bruff; Carrigrohan castle, near Cork; Malahide castle, and (cir. 1564) Howth castle, near Dublin; and some other buildings indicated by PARKER, *Observations on the Ancient Domestic Architecture*, in the *ARCHÆOLOGIA*, 1860, xxxviii, 149; and by WILKINSON, as above. Ecclesiastical architecture continued to retain an appearance of Pointed art: the cathedral at Kildare was rebuilt by bishop Lane 1482-1523; the cathedral at Derry, finished according to some accounts 1633, has been mentioned by BELL, *Essay*, 8vo., Dublin, 1828, p. 120, as "probably the last of the old Gothic cathedral churches built in Ireland;" the repairs 1613, and restoration 1663-75 of the cathedral at Armagh, may be also noticed: indeed, the revival of Pointed architecture in Ireland may be said to have commenced at this edifice 1782 with the projected rival to the steeple of Magdalen college, Oxford. The security afforded by the strong government established by Cromwell was shown in the larger size and number of the windows and in other changes in the form of the mansions that were outside the towns: but these alterations had already appeared within the walled towns. It must be allowed that, between 1530-1700 civil dissensions caused Irish art to sink into a state of insignificance, and when it began to emerge from that condition, the taste that Sir C. Wren directed in England, was displayed 1684 at Kilmainham, near Dublin, which is attributed to him.

The first quarter of the eighteenth century saw a great change in the condition of Ireland as regards building. A number of country mansions were erected with *improvements*, a term which in Ireland expressed the Scottish *polices* or English *pleasure-grounds*. At this period began the use of the "Field, Grove, Hall, and Town", which as names of seats replaced the castles of preceding ages; such as Ballinakill or Burton hall, near Carlow, designed by its owner 1708, "who is a connoisseur in architecture, for the gentlemen in this country that intend to build are continually begging plans for that purpose" from him; such also was a house intended by Mr. Walter Bagnal who died 1744, leaving unfinished, Bagnalstown, near Carlow, that was to have been called Versailles; but having erected Staplestown in the vicinity, which when finished, "might serve an Italian prince." It was stated about 1750 that Belfast was beginning to emerge from obscurity; that within a few years Waterford was increased one-third; and that Dublin had seen four thousand dwellings built in forty-two years, almost all the tolerable streets, with houses generally highly-finished for that age inside, having been built since 1737. At that time the water-works for sawing, boring, and polishing marble were in full activity at Kilkenny; and Waterford-house, the first private residence erected of stone in Dublin, was about ten years old. Art in Ireland seems to have escaped the heaviness of the time that preceded the earl of Burlington's neglect of his town of Youghal for patronage of art elsewhere; indeed, but for Coltsman and Aheron, it might be truly (as usually) said that Palladian architecture was introduced 1737 into that country by Cassels. He was followed by Bindon, Ensor, John Smith, Ducart, Meyers, Cooley, Ivory, Semple, and Gandon, with whom the list of the architects established in Ireland during the eighteenth century ends, although Johnston's restoration with alterations 1784 of the steeple of the cathedral at Armagh was the foundation of the professional fortune which he bestowed 1825 on the Royal Hibernian Academy. Probably no modern Gothic church in Ireland dates before that built 1820 at Connor, co. Antrim. Notice should be taken of two pupils of Gandon, viz., Baker; and Sir R. Morrison, who outlived his son W. V. Morrison; as well as of the names of Pain, Keane, Leeson, and G. Papworth, R.H.A., which close the list of deceased architects in Ireland, where Sir W. Chambers, James Wyatt, and John Nash, were employed in many instances: other English architects had been employed on single occasions.

In the present day architectural practice is greatly monopolised by the architect to the Ecclesiastical Commissioners, who designs all the Protestant (Episcopal) churches in Ireland; another architect designs all the workhouses; another, all the model schools and national schools; the county surveyors superintend all the goals, court-houses, bridewells, bridges, and police offices; consequently most architects have to undertake building, and so carry on both the profession and the trade.

A Tour through Ireland, 8vo., London, 1748, appears to be the foundation of many later works of the kind; BARROW, *A Tour round Ireland through the Sea-coast Counties*, 8vo., London, 1836; BREWER, *Beauties of Ireland*, 8vo., London, 1825 (it does not appear that the promised third volume was ever published); *Excursions in Ireland*, 8vo., 1818-22; HALL, *Ireland*, 8vo., London, 1843; *The Tourist's Illustrated Handbook*, 7th edit., 8vo., London, 1859; WRIGHT, *Ireland Illustrated*, 4to., London, 1829; NEALE, *Seats*, 4to., London, 1823, 1st series, vi, and 1829, 2nd series; STAFFORD, *Pacata Hibernia*, fol., London, 1633, gives some views of the castles; WINDELE, *Cork and its Vicinity*, 8vo., Cork, 1839; MULVANY, *Life of Gandon*, 8vo., Dublin, 1847, details the state of the art in the middle and towards the end of the eighteenth century, and the difficulties he experienced in his early works; O'NEILL, *The Fine Arts and Civilization of Ancient Ireland*, 4to., London, 1863; WAKEMAN, *Archæologia Hibernica*, 16mo., Dublin, 1848.

IRIS, see FLEUR-DE-LIS.

IRIS, see BICE.

IRISH/TOWN or S. CANICR, see KILKENNY.

IRKUTSK. The capital of the government of the same name and of East Siberia, and the see of an archbishop. It is situate at the confluence of the rivers Irkut and Ushakovkar, and is divided into two parts by the river Angara, 1000 ft. wide. The town, surrounded by a wall and ditch, is well built, and consists chiefly of wooden houses painted yellow or light grey, with many of brick; the streets, wide and formed at right angles, have wooden footpaths. A large quadrangular parade has the residence of the governor with the public offices on one side. The other chief public buildings are the cathedral; at least twelve other churches; two convents; a fine exchange, built of stone; the admiralty with its dockyards; the offices of the American company, which would be considered spacious and ornamental in any town of Europe, and their fur warehouses; a gymnasium, and several other schools; a public library of 5,000 volumes; two hospitals; a workhouse; house of correction, a spacious and well-ventilated prison; the *Gostinnoi-dvor*, or working bazaar; and the markets. COCHRAN, *Russia*, 8vo., London, 1824, i, 118, ii, 207, gives a view of the city.

IRON. This well known metal is never found as a mineral in a native or pure state, in consequence of the very great affinity which it possesses for hydrogen and oxygen gas. When obtained pure by electro-deposition, it has a greyish-white colour: a specific gravity varying from 7.9405 to 8.1393; and is susceptible of high polish: as appears from Percy's experiments, its malleability, which is very considerable, is not affected by change of temperature; in which respect it differs from commercial iron. The crystals of iron are cubes—but, according to modern observation, those of cast-iron are sometimes rhombohedral. In its mineral state it is generally found in the shape of oxidized ore, which is reduced to obtain the metal of commerce. The ore is either a magnetic oxide, sesquioxide, hydrated sesquioxide or carbonated protoxide, in various degrees of purity. These ores are widely and profusely distributed in all parts of the globe, and occur, one or more, in nearly every geological formation in veins, masses, or beds. The most important are the following:—

I. *The magnetic oxide*, containing about 72½ per cent. of iron. It is found in large quantities at Gellivara, in Lapland, in Norway, in Sweden, in Canada, in Pennsylvania, and in other parts of North America.

II. *The red hematite*, when pure, contains 70 per cent. of metal. It occurs crystallised, being specular or micaceous, according to the dimensions and character of the crystal; and massive or earthy, generally in reniform or botryoidal nodules of a more or less fibrous and radiating structure. Some varieties are hard, compact, and rough: others are soft, pulverulent and greasy. Specimens of the first named are found at Hennock and Buckfastleigh in Devonshire; the massy, earthy varieties are largely distributed throughout the carboniferous strata of Lancashire and Cumberland; the carboniferous limestone of the Mumbles, near Swansea; and the Devonian limestone at Brixham.

III. *The brown hematite*, yielding when pure, about 60 per cent. of metal: under this generic name are included all the varieties containing hydrated sesquioxide of iron. It occurs, sometimes as a finely fibrous rich brown ore, but generally as an ochreous yellow brown earthy mineral, in large quantities in South Wales, in Northamptonshire, and in Lincolnshire. The bog iron ores and the so-called lake ores, of Sweden and Finland, and most of those of the French and Belgian mines, as well as many of the United States and of Canada, are essentially brown hematite.

IV. *The spathic ore*, containing about 48½ per cent. of metal, rarely occurs in a pure state, but is generally associated with carbonate of magnesia and carbonate of protoxide of manganese.

It is very abundant in the Erzberg in Styria; at Stahlberg, near Müssen, in Prussia; and in the Brendon Hills and Exmoor in Somersetshire, where it is extracted on account of the qualities it is found to impart to the steel obtained from it.

V. *The argillaceous ore*, so called from its appearance, is compact and earthy in structure, varying in colour from brown to black, and frequently seamed with fissures filled with foreign matter. When of a deep brown or black colour, and combined with coaly matter to the amount of 10 per cent. and upwards, it is termed **BLACKBAND IRON STONE**; which has been largely worked in Scotland since its discovery by Mr. Mushet, and the introduction by Mr. Neilson of the hot blast in the manufacture of iron. The argillaceous iron ores occur abundantly, interstratified with the shale of the coal measures in Yorkshire, Warwickshire, North and South Staffordshire, Worcestershire, North and South Wales, and in Scotland, in the lias of Yorkshire, in the Wealden, the tertiary, and even sometimes in the most recent of the diluvial formations: they form the greater mass of the German, French, and Belgian iron fields, but they rarely contain more than 30 per cent. of the hydrous oxide of iron, combined with much of earthy matter, and other impurities.

Besides the above-named ores, which are those most commonly reduced, there are others that may at times be of sufficient value to be worked for the purpose of local supply; such as the calcareous ore of the island of Sardinia, the arsenical iron, and the yellow sulphuret, the sulphate, the phosphate, the chromate, and even the muriate, the oxalate, the titanate, etc., of iron, and the meteoric iron ore. All these varieties have peculiarities more or less valuable in the various processes of the arts; PERCY, *Metallurgy*, 8vo., Lond., 1861; and URE, *Dictionary of Arts and Manufactures*, 8vo., Lond., 1860, 5th edit., give further information on this branch of the subject; as also a description of the methods of analysis adopted to ascertain the composition of the ores and of the resulting minerals.

The operation of extracting the mineral from the ore is called **SMELTING**: it is an application of the science of chemistry of the highest kind, which is undergoing almost daily improvement. The metal thus obtained, having been subjected to other processes, becomes either **CAST IRON**, **BAR IRON**, or **STEEL**, the operation in each case being essentially different. *Cast iron* was formerly considered to be a combination of pure metal with a large amount of carbon: *bar iron* was supposed to be, more or less, a very near approach to a state of purity, without any carbon or with an almost imperceptible proportion of that ingredient: and *steel* was held to be metal in a mixed state, with a greater proportion of carbon than in wrought, and less than in cast, iron. The recent researches of M. Frémy and M. Caron, however, appear to throw considerable doubt upon this theory; M. Frémy thinks that he has ascertained the presence of nitride of iron in the samples of steel that he analysed, and he is disposed to think that nitrogen is an indispensable ingredient in that material, which is in fact a carburetted nitride of iron. M. Caron, however, holds that the nitrogen has very little effect upon the composition of the steel, and that a greater result is produced by the addition of the cyanides, or the ferro-cyanides. But in both cases these chemists agree in the compound nature of steel, and they attribute its formation to the presence of infinitely small proportions of either nitrogen or cyanogen. Bessemer's process, in converting the cast metal after a first fusion at once into steel, by driving air through the iron in its molten state, in the course of which operation it may yield the necessary quantity of nitrogen, is a confirmation of these opinions.

The processes employed in the reduction of the ore remain very nearly in their ancient state, and they may be briefly described as follows:—

If the ore be argillaceous, calcareous, or brown hæmatite,

it is generally submitted to the preliminary process of *roasting*, in order to drive off the moisture, the sulphuric acid, and the carbonic, phosphoric, etc., acid gases that may be present. This process takes place in the open air, with a singular waste of fuel. After calcination, the ore is brought to the mouth of the furnace, which is generally built upon a hill-side, in order to avoid as much as possible the expense of carriage. The particular system adopted for smelting depends greatly upon the quality of the fuel; but as English manufacturers are confined to the use of coal or coke, there is no occasion here to discuss the advisability of using any other material. The furnace is a large mass of masonry, usually square at the base, with the sides carried up in a slight slant, forming externally a truncated pyramid. Large arched recesses in them contain openings into the furnace to admit the *blast*, or the current of air, and for 'running' or letting out the metal and the impurities. On the top of the furnace, a cylindrical erection of brickwork, called "the tunnel head," protects the workman against the heated gases given off by the incandescent materials below; it has one, or more openings, through which the charges of ore, fuel, and flux are thrown. In front of the furnace is the *casting-house*, where the metal from the furnace is run into moulds formed in the sand floor, generally under cover. The kind of blast employed has no material influence upon the construction of the furnace, but rather upon that of the accessory buildings; as the only alteration made in the former in consequence of the substitution of the *hot*, for the *cold*, *blast*, consists in the dimensions of the nozzles, or air passages. When the **COLD BLAST** is used, a smaller quantity of air is admitted than with the **HOT BLAST**; but the manufacturers make a difference in proportion to the nature of the iron they intend to produce. The means employed for heating the blast are very simple: they consist, in fact, in causing the air to traverse a series of pipes that are placed in a furnace before it reaches the piston of distribution. There are differences in the working details of the pipes and ovens, such as the introduction of Siemens's reverberatory furnace, and the use of the hot blast oven; but the object aimed at in all of them is to prolong the contact of the air with the heating surface.

The dimensions of the furnace being arranged in accordance with the nature of the ore and the kind of blast, the charge varies according to the quality both of the fuel and of the ore; a limestone flux being required for an argillaceous ore, and a clay flux for a calcareous one. Generally, cold blast furnaces consume coke; hot blast are worked with raw coal; and M. DUFRÉNOY, in his *Report*, states that the increased temperature of the hot blast furnace, fusing more readily the earthy and other impurities, occasions a considerable reduction in the quantity of limestone. The usual charge is in about the proportion of 425 lbs. of calcined ore to 390 lbs. of coal and 170 lbs. of limestone. These materials are thrown in gradually from the top; the heat penetrating the whole mass, the iron falls through the glowing fuel and accumulates at the mouth of the furnace; the blast nozzles called *twyers* (or *tuyères*) being raised to suit the height of the liquid mass, and the impurities rising to the surface as a scum, slag, or cinder, composed of the silica and alumina, united with the lime of the flux. Great care is required in order to prevent the formation of pipes around the twyers in consequence of the introduction of the great mass of fresh air. This inconvenience is obviated by increasing the burden or quantity, of the mine or ore, in the charge, by which the temperature of the interior mass is also increased. The molten iron is run off once in twelve hours into moulds formed in the sand floor of the casting-house; these are called by the workman, *soves* and *pigs*, the former being the leading currents and the latter their off-shoots. The opening in the dam stone of the hearth allows this periodical running of the metal, which is stopped with loam mixed with sand; the slag is run off at the same time, but being much

lighter it is easily separated from the metal. Continuous action was formerly considered necessary for successfully working a furnace, and as soon as one charge was run out another succeeded it. No inconvenience is now found to arise from the furnaces remaining idle one day in the week.

The presence of sulphur in the ores is likely to be very detrimental to the quality of the metal, and to reduce its tenacity in a remarkable manner; the danger is also much increased by the nature of the fuel employed, hence the preference given by manufacturers to coke over coal, notwithstanding the higher price of the former. The presence of phosphorus in the ore tends to render the iron *RED SHORT*. Manganese is generally considered prejudicial, but chemists are at present rather divided on the subject; while silica is universally considered to exercise a bad influence upon the metal, with which it forms an alloy that is with difficulty driven off. Several other minerals have an obscure but more or less injurious influence upon the metal, such as arsenic, aluminium, calcium, magnesium, etc. The carbon which combines with the metal is present in the form of graphite, or in chemical combination; graphite is present in greater proportions in grey cast iron, is less distinctly marked in mottled iron, and the carbon is nearly all chemically combined in *white cast iron*; usually *grey cast iron* contains more of it than the white. *CAST IRON*; *COLD SHORT*; *FOUNDRY*.

The *puddling* or *rolling* process is that by which carburized iron is converted into comparatively pure metal. It has for its object the extraction of the carbon, the introduction of a greater quantity of oxygen, and the elimination of the phosphorus and some metals combined with the iron as it leaves the blast furnace. There are two main divisions in this process, the charcoal, and the coal, according to the locality and to the particular uses to which the iron is to be applied. The former is, however, generally confined to Sweden, where charcoal cast iron is converted into wrought iron of the same description, in the charcoal refinery, without any intervening preparation. In England, coal is nearly always used for converting the raw forge pigs into wrought metal by boiling in the puddling furnace, the iron being first deprived of the other metals by the refining process.

In *refining* iron, the crude pigs are deprived of the greater portion of the carbon by melting in a hollow fire, and exposure to a current of air forced over the surface by a fan or blowing engine. The carbon combines with the oxygen of the air, and passes off in the form of carbonic oxide; and at the same time a portion of silicium, etc., is thrown off in the form of slag; but the iron is liable to take up quantities of sulphur and other impurities from the coal, and as it is acted upon only superficially by the blast, the operation cannot be quite effectual. From the refining furnace the metal is run out into large moulds, and then broken up into pieces of a size convenient for further operations. The details of the process of refining vary, but they all have for object the elimination of carbon, and the impurities held in combination with the iron; and as these details are at the best dependant on the local varieties of the ore, or on the fuel employed, they do not here require further notice.

From the refinery the iron is taken to the *puddling* furnace, which is so arranged that the metal is exposed to the action of the flame, but not to contact with the actual fuel, which is separated from it by a partition or bridge: this furnace is called a reverberating furnace. In it the iron is kept in a state of fusion, whilst the workman or puddler, with a rake or *rabble*, so agitates it, that the whole is exposed to the action of the oxygen passing over it from the fire, and the remaining portion of carbon is oxidized, the metal being gradually reduced to the state of a tough pasty mass, and subsequently to a granular form; the slag or impurities, under the influence of the intense heat, running off from the bottom in a fluid state. The iron in this stage is comparatively pure, and capable of agglutination,

which is effected by the puddler rolling together on the hearth of the furnace, the nodules into balls of convenient dimensions, which are subsequently submitted to the action of a 'tilt hammer' or other means of mechanical pressure. Formerly all the wrought iron manufactured was thus subjected to the double process of refining and puddling; at present, however, refining is generally suppressed, and the iron is subjected to what is called boiling, which drives off the carbon in the puddling furnace, where the evolution of the gas becomes so energetic that the iron appears to boil. This effect is produced by the mixture of a portion of crude iron, with a certain proportion of oxygen and very little carbon, with the metal to be converted. It is to be feared that the extra labour occasioned by this system, and the greater loss of metal, may lead manufacturers to prefer the old process. Steam has been applied in the progress of puddling with very considerable success; the oxygen of the steam having, at the high temperature to which it is exposed, a greater affinity for carbon than for iron, the liberation of the former is effected more easily; whilst the hydrogen, having no affinity for iron, unites with the sulphur, arsenic, phosphorus, and those other impurities prejudicial to the quality of the iron. Steam has also a mechanical action; as being introduced at the bottom of the charge, and thence diffused upwards, it violently agitates the whole mass, and causes fresh surfaces to be exposed to the contact of the oxygen of the blast. Some other descriptions of furnaces allow of the elimination of the carbon with more or less facility, such as the Silesian furnace, etc., but they do not present any difference in principle sufficient to call for special notice.

The further processes to which crude metal is exposed during its conversion into mercantile iron, are *shingling*, *hammering*, *rolling*, and *making into uses*, as the forging it of the peculiar forms demanded for trade, etc., are called. The *puddled balls* are first reduced to the state of *blooms*, by being passed under the 'tilt hammer'; or they are *shingled* to the form of a long parallel slab, during which operation the impurities connected with the metal are driven out in the form of slag or cinder, and the metal becomes dense, compact, and to a certain extent malleable. The blooms are then heated, and passed through a series of grooved rollers, which give them the form of long slender bars, called *puddle bars*; these are cut up, piled regularly together, or *faggoted*, and brought to a welding heat in the *balling furnace*; again passed between a series of grooved rollers, where they are finished for the purposes of trade in the shape of merchant bars; it is of course necessary that some processes of *shearing*, or shaping the iron, should be first performed. The recent introduction of Nasmyth's hammer is a modification of the tools employed in the preparation of merchant bars, which has very much facilitated the manufacture of the various kinds now so greatly employed for building operations, in the shape of wrought iron joists, *T* pieces, angle iron, and other forms. The rolls used for the manufacture of boiler plate are, in principle, the same as those used for rolling bars, differing only in being wider and more carefully made, so as to preserve the parallelism of the surfaces. A necessary adjunct to the rolling mill is a saw for cutting off the ends of the rods; this is made to revolve at the rate of 800 to 1000 revolutions in a minute. For cutting the ends of railway bars, the saw is repeated at both extremities, and the bars are brought forward on a bed by the intervention of a *cam* or an eccentric which carries the whole of the bar to meet the saws, which are, in their turn, moved by the same machinery.

Of late, attention has been called in a special manner to the great improvements in the manufacture of iron made by Bessemer. The processes introduced by him are connected with the preparation of wrought iron and cast steel, and perhaps with the improvement of the quality of cast iron; the application, in either case, depending on the economy resulting from the employment of particular ores, found under various conditions. These various processes are based, in fact, on the

introduction of atmospheric air into the mass of the liquid iron obtained from the blast furnace. The strength of the metal thus produced depends greatly upon the proportion of carbon retained in it. Thus *pure iron*, from which every particle of carbon has been withdrawn by this process, resists a tensile strain of 72,000 lbs. on the square inch; while ordinary *wrought iron*, which is of about the same nature, is calculated to resist a tensile strain of 56,000 lbs. *Cast iron*, which is said to retain 4 per cent. of carbon, has only a tensile strength of 18,000 lbs.; but if the proportion of carbon left in it be 1 per cent., or nearly the proportion present in *cast steel*, the resistance amounts to 130,000 lbs.; and with Bessemer's process, steel containing $1\frac{1}{4}$ per cent. of carbon yields an ultimate resistance of 160,000 lbs. The advantage of this process consists, in fact, in the ease with which it produces either iron, semi-steel, or steel, according to the extent to which it may be carried, and to the mixture with other metals, or ores of iron. The manufacture of steel rails, steel girders, steel boiler-plates, etc., is mainly due to this important process of Bessemer's, one which may tend to do away with all mere *cast* or *wrought iron* in building constructions. Several precautions must be observed, and several mixtures of iron with substances contribute to the resulting material, the nitride of carbon, which Frémy considers to be the all important element in the composition of *STEEL*, which will be noticed in detail when that subject is treated; and the further consideration of Bessemer's process under Malleable cast iron, and wrought iron. G. R. B.

ARIGNA; ALLOY; BLACKBAND; CAST IRON, which gives the qualities and their uses for building, etc., operations; CHARCOAL; COLD SHORE; DILATATION; EXPANSION; MALLEABLE CAST IRON; METALLURGY; OXIDATION; PIG; PRESERVATION OF IRON including effects of the weather, etc., upon the metal; RED SHORE; STEEL; WROUGHT IRON.

GEOLOGICAL SURVEY OF GREAT BRITAIN, *Iron Ores of Great Britain*, parts i and ii, 8vo., 1855; ROGERS, *Elementary Treatise on Iron Metallurgy, up to the Manufacture of Puddle Bars*, built upon the Atomic System of Philosophy; comprising Suggestions relative to Improvements in the Manufacture of Iron and Steel, and the conduct of Extensive Iron Works; with Analytical Tables of Iron-making Materials, 8vo., Lond., 1857; OVERMAN, *Treatise on Metallurgy, comprising Mining, and General Operations, with Descriptions of Furnaces, Blast Machines, Forge Hammers, etc.*, 8vo., Phil., 1852; TRURAN, *The Iron Manufacture of Great Britain*, plates of furnaces and machinery, 4to., 1855; TRURAN, *The Iron Manufacture of Great Britain, theoretically and practically considered; Details of Ores, Fuels, and Fluxes employed; Calcination; the Blast, Refining, and Puddling Furnaces; Engines and Machinery*, etc., 2nd ed., revised by Phillips and Dorman, 4to., 1862; LESLEY, *Iron Manufacturers' Guide to the Furnaces, Forges, and Rolling Mills of the United States*, 8vo., 1859; WILKIE, *Manufacture of Iron in Great Britain, with Remarks on the Employment of Capital in Iron Works and Collieries*, 8vo., 1857; BEECROFT, *Companion to the Iron Trade, and General Assistant to the Iron Master and Merchant*, 4th ed., enlarged by Butler, 12mo., 1857; OVERMAN, *Manufacture of Iron in all its Branches*, 8vo., Philadelphia, 1845, 1851, 1854; FLACHAT, BARRAULT, et PETIT, *Traité de la Fabrication de la Fonte et du Fer*, 3 vols., 4to. and fol., Liège, 1851 (said to be the best and most comprehensive work published on the manufacture of iron); FAIRBAIRN, *Iron, its History, Properties, and Processes of Manufacture*, 12mo., Edinburgh, 1861; new edit., 8vo., Edinburgh, 1865.

IRON. "Within the last half century," states AITCHISON, *Iron as a Building Material*, read at the Royal Institute of British Architects, February 1864, "the use of iron has become so general that it has nearly usurped the place of other materials. In every construction, machine, tool, or article of domestic use, we may find iron doing duty not unfrequently in the most unexpected ways and places.—Architects, there-

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fore, must not alone refuse to profit by the advantages it offers, or, when they are absolutely obliged to use it, give it a sort of grumbling recognition and put it out of sight. Many have used it with success, but by the profession generally it is avoided." Probably this has arisen, hitherto, from the complex way in which the qualities of the material have been brought before the student. No sooner were the capabilities of cast iron understood, and the professional man induced to make use of it in his works, than he learnt, both from practice and hearsay, to doubt its being trustworthy, the very purpose for which it had been recommended. Wrought iron was then experimented upon, and put forward as the proper material; but now, after some years of its employment, he is advised by some, to return to his original material, and use oak timber, occasionally assisted by plates of wrought iron! The hesitation to use iron is perhaps due to the little study hitherto bestowed by architectural students on mathematics, statics, and the strength of materials.

"Iron," continues AITCHISON, "differs in this respect from other materials, that while of the latter thousands of examples are known; of the former but few exist, so that we must have some slight acquaintance with the laws by which it is governed before it can be used safely or properly.—To appreciate its value as a building material, it must be compared with those materials whose place it is about to supply, for its capabilities cannot be judged until it is known in what relation it stands to them. These materials are, of course, stone, brick, and timber.

Table of Resistance of Materials to a Crushing or Tearing Force.

| Material. | Weight per ft. sq. | Tearing per square in. | Crush. lg. in. 1 in. sq. | Shearing 1 in. sq. | Crush. Strain 1 in. sq. |
|----------------------|--------------------|----------------------------------|--------------------------|--------------------|-------------------------|
| Cast iron | 480 | 7 | 54 | 24 | 34 |
| Wrought iron | 480 | 7 | 20* | 24 | 34 |
| Portland stone | 134 | 0.4* | 1.5 | — | — |
| Aberdeen granite ... | 164 | 0.33* | 1.6 | — | — |
| Brickwork in cement | 117 | 0.014 | 215 | — | 0.0247 |
| Memel fir, dry | 40 | with grain 6.0 across do. 0.3 | 1.1 | 3 | 50 |
| English oak | 52 | with grain 5 across do. 1.05 | 4.5 | 4.5 | 75 |

* These are doubtful Wrought

Table of Comparative Strength of Cast and Wrought Iron.

| Cast Iron—Crushing. | | Wrought Iron—Crushing. | |
|---|--|--|--|
| $2\frac{1}{2}$ times strong as Wrought iron | | $\frac{1}{3}$ strength of Cast iron | |
| 33 " " Portland stone | | $13\frac{1}{2}$ times strong as Portland stone | |
| 10 " " Aberdeen granite | | 4 " " Aberdeen granite | |
| 229 " " Brickwk. in cement | | 91 " " Brickwk. in cement | |
| 36 " " Fir | | 14 " " Fir | |
| 11 " " Oak | | $4\frac{1}{2}$ " " Oak | |
| Cast Iron—Tearing. | | Wrought Iron—Tearing. | |
| abt. $\frac{1}{3}$ the strength of Wrought iron | | abt. 3 times strong as Cast iron | |
| 17 times strong as Portland stone | | 50 " " Portland stone | |
| 20 " " Aberdeen granite | | 67 " " Aberdeen granite | |
| 470 " " Brickwk. in cement | | 1342 " " Brickwk. in cement | |
| 1.16 " " Fir | | 3 $\frac{1}{2}$ " " Fir | |
| 1.4 " " Oak | | 4 " " Oak | |

"From these tables it will be seen how much stronger cast iron is in compression, and wrought iron in tension, than any of the other materials: but the advantage gained by substituting wrought and cast iron for them is greatly increased by the facilities they offer for using the material in the position where it is able to exert its full force—as in a deep girder." G. A.

Estimating the resistance to crushing at 1000, the following results are obtained, as deduced from late experiments; WARR, *Dynamics*, 8vo., London, 1851.

| Material. | Compression. | Tension. | Transverse Strain |
|-----------------|--------------|----------|-------------------|
| Timber | 1000 | 1900 | 85.1 |
| Cast iron | 1000 | 158 | 19.8 |
| Stone | 1000 | 100 | 10.0 |
| Glass | 1000 | 123 | 10.0 |

TREDGOLD, *Practical Treatise on the Strength of Cast Iron*, etc., 8vo., 1822; 1824; 1831; new edition by HODGKINSON,

8vo., 1842-6; 1860; BARLOW, *Treatise on the Strength of Timber, Cast Iron, etc.*, with rules, 8vo., 1826; 1837; revised by HEATHER, 1851; MUSHET, *Papers on Iron and Steel, Practical and Experimental*, 8vo., 1840; ECK, *Traité de Construction en poteries et fer, à l'usage des bâtimens civils*, etc., fol., Paris, 1836; 1841; ECK, *Application du fer, de la fonte, et de la tôle, dans les constructions civiles*, etc., fol., Paris, 1841; *Annales des PONTS ET CHAUSSEES* (dates are given below); BELL, *Laws of the Strength of Wrought and Cast Iron*, in *Transactions of Institute of Civil Engineers*, 1857; FAIRBAIRN, *Useful Information for Engineers*, 1st series, 8vo., 1864, 4th edit.; 2nd series, 8vo., 1860; SHIELDS, *Strains on Structures of Ironwork, with practical remarks on Iron Construction*, 8vo., 1861; WARR, *Dynamics*, 8vo., 1851; KIRK-ALDY, *Results of an Experimental Inquiry into the comparative Tensile strength, and other properties, of various kinds of Wrought Iron and Steel*, 2nd edit., 8vo., 1862; FAIRBAIRN, *Application of Cast and Wrought Iron to Building Purposes*, 8vo., Lond. and Camb., 1857-58, 2nd edit.; 3rd edit., 1864; Part I treats of cast iron beams for supporting floors, and on compound or trussed cast iron beams or girders. Part II, of wrought iron beams for supporting floors, and other purposes; and of wrought iron trellis girders. Part III, of the construction of fireproof warehouses. Part IV, of the adaptation of malleable iron beams or girders to the construction of bridges.

During the eighteenth century the application of iron to the construction of buildings advanced from the support of tracery, as described by VIOLLET LE DUC, *Dict.*, s. v. Meneau, from the tie-bars, rods, and chains for the retention of walls, and from the extraordinary combination into trusses for the carriage of masonry, as described by PATTÉ, *Mémoires*, 4to., Paris, 1769, p. 266-318, to the frame 1809 of the roof of the halle au blé at Paris; while as early as 1779 cast iron was used for the arches of bridges.

In the nineteenth century the use of wrought iron in large masses seemed to be abandoned, and during the first half of that age, cast iron seemed to take a place in which it would not be superseded. Sir Robert Smirke, R.A., states that "I do not know that I was the earliest to use cast-iron girders, but I never saw or heard of any, except at some small factory buildings in Manchester, until about 1810; I was then engaged in rebuilding part of Lord Bathurst's house at Cirencester; for that purpose iron girders between 30 and 40 ft. long were cast at Coalbrookdale, and the front wall, with other parts of the building, rests upon them." This employment of cast iron girders, and the patent granted 1811 to T. Pearsal for cast iron rafters, joists, skeletons for stairs, frames for windows, sashes, etc., seemed to indicate that nearly the whole of a house, except the walls, would be made of cast iron. This period, as regards external decoration, culminated in England in the erection of the cast iron columns 1817-20 to the Quadrant in Regent-street, with the gates and railings 1820-25 in the Regent's Park; but as regards internal construction the casting of the elliptic girders 40 ft. 6 ins. span and 11 ft. 9 in. rise, for the roof 1837 of the Polytechnic Institution, Regent-street, was considered a triumph of skill. But almost at the same time, cast iron nails, hinges, pipes, rails, lamp-posts, rain-water pipes, sashes, chimney-pieces, stove-grates, boilers, and fenders, were being made of such inferior metal that a slight blow would destroy them; and the fears entertained that similar iron would be supplied for constructive purposes appeared to be verified by several accidents. Even GUILT, *Encyc.*, 8vo., Lond., 1842, although aware that I was then considered the strongest form of section for a cast iron beam, entered into calculations for rectangular beams only: and he was soon justified by the place in popular favour which was taken by rolled iron between 1840 and 1850, so that the building for the Exhibition of Industry of All Nations 1851, consisted chiefly of that material, which eventually has led to its more general application.

For Australia, and other places where builders and building materials are scarce, the invention of portable iron houses seemed to meet a temporary emergency. It is found, however, from their conducting power, that both heat and cold are almost insupportable in them. The expense of erection is also at times exorbitant. A merchant who took out to Melbourne an iron store, which cost £180, had to pay £700 for its erection, the wages of mechanics at the time being enormous. Timber frames also involve workmen's heavy wages, and are liable to injury from alternations of temperature and of moisture. Such portable houses continue to be largely manufactured at Glasgow, where at Walker's works, they are kept ready made; they measure 21 ft. by 14 ft., having three apartments; the pillars and window and door frames are of cast iron; sleepers and frame of wood 2½ ins. by 6 ins.; and the flooring, roofing, etc., 1½ by 6 ins. An iron building put up near the Art Treasures Exhibition at Manchester, 1857, excited attention in consequence of the rapidity with which it was done, at a cost of about £400, by Bellhouse and Co., for Mr. Ogden, of Long Millgate, Manchester, for the purpose of receiving his collection of paintings and curiosities. It consisted of a cellar and upper room, 65 ft. long and 32 ft. wide; the cellar 8 ft. high; the walls of brickwork; the upper room 15 ft. high to the eaves, and the roof raised so as to give sloping and perpendicular glazed lights; thus leaving the whole of the wall space free for pictures and other objects. The shell of the upper portion of the building above the floor, was composed of corrugated iron sheets, attached to pilasters and roof principals. The interior was lined with boarding, upon which was laid paper and maroon-coloured calico cloth. Thirteen working days only elapsed between laying the first brick and the completion of the building, and this short time included the manufacture of materials as well as its complete erection. An interesting discussion on the employment of iron for structures, and as to its expansion, at the Polytechnic Club, New York, is reported in the ARCHITECTS AND MECHANICS' Journal, and given in the DUBLIN BUILDER Journal, 1860, ii, 270-1. It is stated therein that the first iron house was erected there in 1847; although in London, a gas house had been built entirely of corrugated iron and iron rods in 1834-5, and an iron lighthouse had been erected at Glasgow in 1824. Temporary sheds have been formed as follows, within the metropolitan district:—37 ft. long, 13 ft. wide, 8 ft. high to the eaves; the framework of angle iron 2½ ins. by 2½ ins. by ½, bolted to wood plate and sill 3 ins. by 3 ins.; rafters of trough iron 1½ in. by 1½ in.; tie and king rods ½ in. diameter; the roof and sides covered with galvanized corrugated iron. An iron theatre is described in BUILDER Journal, xiii, 533; 584: a shot tower, in p. 616: Barracks for hot climates, in Papers of Corps of Royal Engineers, 4to., ii, 233-50.

Churches, have also been largely erected, by Hemming of the Clift House portable building manufactory, Bow, for any required number of persons; and are said to have been found especially adapted, both for hot and for cold climates. Such structures have been described in the BUILDER Journal, ix, 67, 153; xiii, 508; xiv, 36, 210; xviii, 304, 583; BUILDING NEWS Journal, iii, 591, 670; vi, 910; CIVIL ENGINEER Journal, xiv, 41; xvii, 278; xx, 236; ANNALES DE LA CONSTRUCTION, at Paris, fol., Paris, 1856, ii, 49; ILLUSTRATED LONDON NEWS, 1844, v, 208, one for Jamaica, 65 ft. by 40 ft., chancel 24 ft. by 12 ft., cost £1000. The church of Ste. Eugène near Paris, built of iron and of béton by Coignet's patent, is noticed in BUILDER Journal, xv, 106; xxii, 863, and later.

LIGHTHOUSE; SPIRE; STAIRCASE; THEATRE; also BEAM; DECOMPOSITION; FLOOR; GALVANIZED IRON; GIRDER; JOIST; PILLAR; ROOF; STANCHION.

The construction of iron bridges being now somewhat foreign to the profession of an architect, a list only of works on the subject, with the exception of SUSPENSION BRIDGES, is here given. The article BRIDGE gives the publications relating

more strictly to those of stone. POLONCEAU, *Notice sur le nouveau système de ponts en fonte suivi dans la construction du pont du Carousel*, 4to., Paris, 1839; MARCELLIS and DUVAL, *Notice sur un nouveau système de ponts en fonte*, 8vo., Liège, 1840; *Description du Pont de fer coulé construit à Paris en face du Jardin du Roi*, 4to., Paris, 1814; ALLGEMEINE BAUZEITUNG, specially 2nd ser., pl. 478-487, bridges in England and America; NOUVELLES ANNALES DE LA CONSTRUCTION, fol., Paris, 1855, et seq.; *Annales des PONTS ET CHAUSSÉES*, 8vo., Paris, 1st ser., 1831-40; 2nd ser., 1841-50; 3rd ser., 1861, et seq.; ALLGEMEINE BAUWESSEN; MOLINOS and PRONNIER, *Traité théorique et pratique de la construction des Ponts Métalliques*, 4to. and fol., Paris, 1857, a very important work; RONDELET, *L'Art de Bâtir*, and its continuation by BLOUET, 10th edit., 4to. and fol., Paris, 1852. BOW, *Treatise on Bracing, with its application to bridges*, etc., 8vo., Edinburgh, 1851; GODWYN, *Iron tension bridges*, in papers of the Royal Engineers, 4to., London, 1844, x; HUMBER, *Practical Treatise on Cast and Wrought Iron Bridges and Girders as applied to Railway Structures and Buildings*, imp. 4to., 1857; 1860: his *Complete Treatise on Cast and Wrought Iron Bridge Construction, including Iron foundations*, 2 vols., imp. 4to., 1861; 1864: and his *Record of the progress of Modern Engineering*, etc., contains a few late examples, 2 vols., imp. 4to., 1863-64. DEMPSEY, *Malleable Iron (tubular) Bridges* (containing the Britannia bridge; that at S. George's landing-place, Liverpool; and over the Trent at Gainsborough), 4to. and fol., 1850; *Tubular and other Iron girder Bridges*, 12mo., 1850; and *Iron applied to Railway Structures*, 4to., 1850 (contains Newcastle High Level bridge); LATHAM, *Construction of Wrought Iron Bridges*, etc., 8vo., Cambridge, 1858; BAKER and DOWLING, *Formulae and Rules for Students and Engineers*, etc.—and for finding the strain and breaking weight of wrought iron bridges, etc., 12mo, London, 1862; CAMPIN, *Diagrams to facilitate the calculation of Bridges*, 4to., London, 1861.

IRON CEMENT. A mixture used for filling up the joints in iron work. For connecting the cast iron plates of tanks, it is formed of 16 parts of iron borings or turnings of cast iron free from rust; 2 of powdered sal ammoniac (muriate of ammonia); and 1 of flour of sulphur, mixed well together in a mortar, kept dry and close. When used, 1 part of this mixture is added thoroughly to 20 of clean borings, with sufficient water to bring the whole to the consistence of paste. It dries as hard as the metal itself, and forms a joint quite impervious to water: 3 parts of sal ammoniac, and 2 of sulphur; with 10 to 12 parts for the mixture, is also stated for this cement; as also, that if the filings are of hammered iron, the cement is stronger than when those of cast iron are used; or at least one-third of the former is to be mixed with two-thirds of the latter. One part of sal ammoniac with 50 to 100 parts of fine iron filings also forms a receipt. The *Engineers*, etc., *Pocket Book*, adds that a little grindstone dust improves this cement. It also gives as a cement for steam pipe joints etc., with faced flanges;—2 parts of white lead with 1 of dry red lead, ground or otherwise mixed to a thin putty, and applied in interposed layers with one or two thicknesses of canvas or gauze wire, as the case may require. Another composition consists of 4 parts of fine iron borings or filings, 2 of potter's clay, and 1 of pounded potshers, made into a paste with salt and water; if allowed to concrete slowly on iron joints it becomes very hard. This is often used, with the following, for filling up joints and cavities in iron, so as to obtain an uniform coat for paint, and very often unfairly to conceal defects in the metal:—iron filings pounded and sifted, and mixed with from 1 to 2 per cent. of borax, with water enough to bring it to a pasty consistence. Red lead putty is generally used for wrought iron pipes. White of eggs, with flour and water well mixed and smeared over linen cloth, forms a ready lute for steam joints in a small apparatus.

Boiled linseed oil and red lead mixed to form a putty, as
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well as bullock's blood mixed with finely sifted quick lime, are used by coppersmiths and engineers to secure joints and rivets of boilers. For cementing stone and iron, a compound of equal parts of sulphur and pitch answers well. In fixing iron railings into stone, if the ends of the iron work be dovetailed and the holes in the stone be cut so as to leave a regular cavity round the metal, and then be filled in with Portland cement, no fear need be entertained, it is said, of the stone being split from oxidation of the iron, as is often the case when lead is employed.

IRONING ROOM. The room, in a laundry establishment placed adjoining to, or over, the washhouse, set apart for those engaged in ironing the smaller articles of wearing apparel. Light and ventilation are the chief essentials. Ironing boards when made for each person, should be about 4 ft. long and 34 to 36 ins. wide, excepting for ironing very small articles. An 'ironing stove' of the usual form is provided for heating the irons; and in large establishments this is supplied either by a hot plate, or by a sort of kiln similar to those used by tailors and hatters. These latter stoves are also often employed for heating the drying closet at the same time, the pipe being carried under the closet, as detailed in *Detached Essay*, s. v. Drying Closet. The woodcut shows a useful and safe plan of arrangement for a large family when there is available space:



ing the smoke-flue *f*; this is found both efficient and economical. At *g* are the soot-doors for cleaning the pipes and flue. The first named stoves usually stand in the middle of the room, the pipe being carried into a flue or through the wall only; the heat from the stove and pipe being sufficient to allow the room itself to be used both for drying and for ironing purposes, though to the detriment of the health of its occupants. In this case the clothes are hung on horses or lines, or on rails suspended from the ceiling by ropes and pulleys so as to be raised or lowered at pleasure. The mangle is occasionally likewise placed in the ironing room.

IRONMONGERY. (Fr. *quincaillerie*; Ital. *chincaglieria*). Hardware articles used in finishing houses, chiefly for the use of the joiner. The heavy iron work for the carcass, as columns, girders, cantilevers, railings, water pipes, etc., go under the trade of the **FOUNDER**; whilst straps, ties and such like, generally go under the head of **SMITH'S WORK**. The ironmonger furnishes the various workmen with their tools (Fr. *taillanderie*); generally deals in culinary utensils, fenders, etc. Those articles which affect the architect directly or indirectly will be found under their respective heads, and their enumeration may be useful. ADZE, AUGER, AWL, AXE, BAR, BELL, BILL-CRANK, BENCH SCREW, BEVEL, BILL, BIT, BOLT, BRACE, BRACKET, BRAD, BRADAWL, BRADDDING HAMMER, BRICK AXE, BUTT, BUTTON, CALIPERS, CENTRE-BIT, CHISEL, CLOAK PIN, COLLINGE'S HINGE, COMPASSES, COUNTER SINK, CRAMP, DOOR SPRING, DRAW-BORE PIN, DRAWER HANDLE, DROP HANDLE, DRAWING KNIFE, ESPAGNOLETTE, FILE, FILISTER, FIRMER, FLUSH-RING, FLUSH-BOLT, GAUGE, GARNET, GIMBLET, GOUGE, GLUE, GRATE, GRIND STONE, GUARD-BAR, HACKING-KNIFE, HAMMER, HATCHET, HASP, HINGE, HOLD-FAST, HONE, HOOK, JOINTER, KNOB, LATCH, LOCK, LOCK FURNITURE, MALLET, MITRE BOX, MITRE SQUARE, MORTICE LOCK, NAIL, NIPPERS, PADLOCK, PHILISTER, PINNERS, PLANE, PLIERS, PLOUGH, PULLEY, PULPIT LATCH, PUNCH, RANGE, RASP, REDMUND'S HINGE, RIM LOCK, RIMER, RIPPER, RULE, SASH FASTENING, SASH LINE, SASH WEIGHT, SAW, SCRAPER, SCREW, SHUTTER BAR AND SHOE, SPOKE SHAVE, SPIKE, STAY BAR, STOCK AND BIT, STOCK LOCK, STOVE, STUB, TACK,

TROWEL, TURNBUCKLE, VICE, WHETSTONE, WIMBLE, WIRE. IRONMONGERS' *Cost Price Book*, for Contractors, etc. A. A.

IRON PAINT. One of the materials employed to protect iron from oxidation. A. de Cartier's iron minium paint, made at Auderghem, near Bruxelles, is a new invention to supersede lead minium or red lead, which is considered destructive to iron. The basis of this colour is peroxide of iron mixed with one-fourth part of its weight of silicious clay; it contains no acid whatever, and is regarded as a cheap and good paint for all kinds of ironwork, which it is said to penetrate, giving it an indestructible varnish and effectually preventing oxidation. The substance is an impalpable powder of a rather dark brown colour: it is of an easy application in painting, and covers the surfaces thoroughly, but dries slower than ordinary painting. Mixed with different substances, it gives a variation of colours more or less dark, and after being mixed with oil, it requires about 5 to 6 per cent. of litharge or drying matter. It has been largely used in Belgium by railway contractors and ship-builders; and the Dutch military engineers are said to consider the cost of using it only a fourth of that of oxide of lead. Warner's silicate of iron paint is said to possess the peculiarity and advantage of standing extreme heat and damp; that it is not affected by the strongest acid, sea-water, sulphureted hydrogen, or ammonia; and that it is equally well adapted for iron or wood. The bronze paint is recommended for the fire and fue boxes of engines, funnels, and those parts of iron-work exposed even to a red heat, where paint commonly used would blister and peel off; also for all brick and stucco work exposed to damp. It adheres so tenaciously that sheet iron may be bent until it breaks, without the paint coming off; and when the insides of steam boilers are painted with it, the incrustation or deposit is easily scraped off. The powder when boiled up with tar is a very cheap preservative for iron or wood. It is supplied ground in genuine boiled linseed oil, and made up in about thirty different colours. These are true iron paints; the following should perhaps be more properly termed paints applied to iron-work.

The "Bideford and Mineral black paint" has been exclusively used in H.M. dockyards for forty years. A certificate dated 12 Aug. 1847, states that "its superiority is observable in the preservation of wood, iron, and canvas; it covers the work well, dries quick and hard, is more durable, and does not blister like other blacks, and has a body inferior only to white lead." The "improved coating composition" invented by Peacock and Buchan has been in use on all the iron ships of the Royal Mail Company for many years, from having been found to keep clean several months longer than the preparation hitherto used by the Admiralty; it is now beginning to be used for H.M. ships. Very many of the lifeboats and carriages belonging to the Institution have been repainted with it, as it is found to stand the sea-air and salt-water so much better than ordinary paint. The same parties have invented a composition for the same purpose, which can be obtained ready mixed and of any colour. Wolston's "Torbay Iron paints" for coating materials placed under water or in a position liable to be affected by damp, are manufactured at Brixham in Devonshire. A caisson in Woolwich dockyard, painted nine years since, was stated in 1862 to be in a perfectly sound condition, both under water and between wind and water. These paints are said to have stopped corrosion that had set in; as at Pembroke dockyard, where two iron roofs found in 1859 so corroded as in the opinion of the authorities to need entire removal, were, after two coats of the paint had been applied, allowed to remain. Two coats were put on some corrugated iron roofing at the Aberdare Iron Works in 1853, and one coat since. These paints are characterised by great covering properties, 62 lbs. effectually coating as large a surface as 112 lbs. of lead paint; three coats being considered equal to four of lead paint, and the cost of painting a girder being put at 3s. 2d. against 5s. 3d. done with red lead. The black paint retains its lustre better

than other black paints, especially when exposed to sea-water; it resists intense heat and sulphureted hydrogen, also acid to some extent; and is said to stand "on materials previously coated with coal-tar, where all other paints fail." Specimens from various roofs were shown in the Exhibition of 1862; *BUILDER Journal*, xx, 527. OXIDATION, under which will be included ENAMELLED IRON, lately introduced.

IRON WOOD. The name given to a great variety of woods in consequence of their hardness, almost every country having an "iron wood" of its own. It is chiefly imported from the Brazils, West Indies, etc., in square and round logs, from 6 to 9 ins. diameter and upwards. The colour is very dark brown and red, sometimes streaked, and it is generally straight grained. The more red varieties are frequently called BEEF WOOD.

ASAPHES undulata, white iron wood, and Sideroxylon melonophleum, of the Cape of Good Hope.

OLEA undulata, black iron wood, of the same country.

OLEA apetala, and Notilia ligustrina, of Norfolk island.

COCOLOBA latifolia, and Egiphila martinicensis, of the West Indies.

BARYXILUM rufum, of South China. The *ly-mo* or iron wood is used in China for anchors and other purposes.

METROSIDEROS vera, true iron wood of China and Japan.

ROBINIA panacoco, of Guiana.

ERYTHROXYLON acroleum, and Fagara pterota, of Jamaica.

OSTRYA virginica, or Carpinus ostrya, of the United States, etc.

MESSUA ferrea, of India and the islands adjacent.

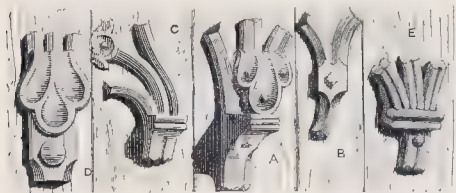
STRADMANIA sideroxylon, of the island of Bourbon.

IRON BARK, is the eighth and last of the woods recognised to be "first-rate" by the authorities at Lloyds, after the opening of the Exhibition of 1851. A specimen from New South Wales had a specific gravity of 1426, with a strength of 1557, English oak being taken at 1000. In appearance it resembled plain brown Spanish mahogany; and it seemed to be not only the heaviest but the most solid of woods. There are both red and grey varieties. *HOLTZAPFFEL, Catalogue of Woods*, 8vo., London, 1843.

IRON WORK. Bar or plate iron converted to useful or ornamental purposes. A general account of the mediæval manner of working in iron, is given by PUGIN, *True Principles*, 4to., London, 1841, p. 21, who states that "tracery was produced by different thicknesses of pierced plates laid over each other. Leaves and crockets were cut out of thin metal plate, and twisted up with pliers, and the lines or stems either engraved or soldered on. By these simple means all the lightness, ease, and sharpness of real vegetation is produced at a much less cost than the heavy flat cast foliage, sometimes chased up. It is likewise to be remarked, that the necessary fastenings for iron-work were always shown and ornamented. Bolts, nails, and rivets,—are beautiful studs and busy enrichments if properly treated. Large tracery was either formed of round iron, like a stem twisted into intersections, or of flat iron bars of different thicknesses riveted together, and the edges chamfered by filing." This account is rather a summary of the merits of iron work during the whole of the middle ages, than an explanation of the way in which the manner of executing the work varied from time to time during that period: such a view, facilitated to some extent by the labours of BRANDON, *Analysis*, 4to., London, 1847, and of VIOLETT LE DUC, *Dicte.*, s. vv. Grille and Serrurerie, is here submitted.

The methods of putting together iron by the smiths, differed according to the nature of the work. Much of the decoration of hinges and ornaments of doors appears to be merely pieces of work put together without absolute connection, as may be seen by the leaf in fig. A: although the same door exhibits numerous joints, welded as fig. B, of the short lengths mentioned by VIOLETT LE DUC as marks of early work. In fig. C, it is possible that the central stem is only fastened by the nail in the flower and by a notch under the band; so in fig. D the ends of the three stems may be hammered flat and be confined by the strap-leaf

which is half the thickness of the leading stem: the bands were separately welded; but they are not so much bands as projec-



tions to reconcile junctions, as appears in fig. E. But work that was independent, such as a railing, needed an absolute connection; and the smith seems to have imitated the contemporary carpenter in the use of slots and mortises, until the invention of clips about the beginning of the twelfth century. In early work it is difficult to tell whether certain small scrolls, etc., have been cut out of the width of the parent stem, or have been welded to it: rivetting, which superseded clipping as well as welding after the year 1300, may be taken as a mark of work executed later than the twelfth century. The clips were closed hot in early work, but in the thirteenth century they were closed cold. In the fifteenth century the smith returned to the original system of making his bars penetrate. But a great change in the construction of ornamental iron-work occurred in the fourteenth century, and was probably due to the locksmiths, who had used perforated sheet iron $\frac{1}{8}$ in. thick in Norman work and later. It may be best described by stating that while the thirteenth century work of queen Eleanor's tomb in Westminster abbey might be specified as "bars finely forged, stamped, chased, and riveted on frames", later work would have to include "sheets hammered, cut, stamped, chased, and welded to bars as above."

The mechanical alterations in the manufacture of bar iron form a great obstacle to the reproduction of such iron-work as was executed in the mediæval period; because unless specially made for the purpose and selected by a smith who knows the difficulty, or rather impossibility, of working successfully in the usual material, the iron of the present day has neither the tenacity nor the ductility which was gained by the old process of repeatedly forging the bar or plate. Thus it is not easy to repeat the mediæval process of slotting a bar so as to get the eyes at equal distances; or of fastening hot (but later, cold) clips; or of making slits into a bar from the edge with a chisel, and then curling the splintered parts. It is equally difficult to imitate the effect of the twisted work, which was scarcely a matter of anxiety to the mediæval smith, whose chief care was bestowed upon the operation of welding, and upon cleaning the angles of his work with the chisel: he did not use the file until a late period. In welding he was careful to fire the two parts separately, getting the upper part to a white-heat and the lower one to a red-heat, and to hammer the joint lightly at first, but more heavily as the work grew colder; and he disguised to some extent the uneven condition of the upper part by punching that part either in separate dots or in close ones forming a sort of incised line. In looking at very large specimens of ancient work, it is necessary to discriminate between the parts that are entirely welded, and those which are only confined at the ends. Where the effect, in use as well as in manufacture and in appearance, required strength of material, a bar was sometimes welded upon another; but very often the same result was obtained by welding bands across the ground-work and inserting short lengths of bar between these bands, to which their ends alone were welded.

The various operations which contributed to form a very highly satisfactory result were so simple that the finest pieces of mediæval work may be analysed and thus described. Having made a full-sized drawing of the design, and a matrix for each leaf and bud, as well as a *swage*, i.e. an anvil cut to each section

which a bar or a band was to assume (this is a point which seems to have been overlooked by VIOLETT LE DUC as to the bars), the smith selected bars as nearly as possible of the proper sizes. Taking a piece rather too long he worked it into a rod (if necessary), leaving at each end a lump; one end was then hammered into a *swage* or die, and the necessary curl given to the rod, which had become a stalk with a foot. As soon as all these were ready, he took two, applied them to the drawing, marked the point of junction, and welded the feet together: the same operation was repeated until the stock was exhausted, leaving him with a number of sprigs ready for combination into branches. The next step was to prepare the branches, which, if molded on the face, were passed between the hammer and the sunk anvil by a process which prefigured that of rolling the bars. In order followed the operations of welding the sprigs to the branches, and of masking (if necessary) the poverty of the joint: usually this mask was merely a molded band, but sometimes it was a band with a cup of leafage or with some ornament; at times the ordinary form of band was changed for a stamped button, etc. Then came the combination of the branches into a stem, by means of bands: the feet of the branches were welded to the stem, and previously prepared bands were laid over the plates of junction, welded, and finished. The greatest difficulty in executing the splendid work of the thirteenth century, was the size and weight of the pieces at the last times of welding: this was obviated to some extent by the omission after 1250 of the welded bands. All these operations, however, were superseded to a great extent by the introduction of sheet iron, in England before 1300, in Germany before 1400, and in France soon afterwards, which was cut and bossed to a remarkable extent, sometimes stamped, and frequently welded to the main portion of the work, but later it was riveted. In work of the fifteenth century the bars were neither stamped nor chased; and the sheets were riveted instead of being welded: but later they were either planted or housed. Finally, the mediæval smith returned to the slots, mortises, and short bars of the earliest period, using clips which were closed with rivets.

Four peculiarities of mediæval iron-work seem to deserve special notice; viz. the irregularities of work produced at the forge were disguised in bars which were punched over all their surface; this effect is lost in the neatness of modern work; the ends of heated bars were hammered into steel dies, which gave the work an appearance of being cast; this seems to have been practised only in the twelfth and thirteenth centuries; the usual sizes of French iron ran in twentieths of an English inch, whence arises a remarkable impression on the eye of a person who habitually measures by sixteenths; and lastly, the smith had a predilection for twisting his bar, and for welding bands upon it, the latter operation being more difficult than the former. Some examples of twisted work remain to puzzle many a modern smith who, although he can twist small work at a blood-heat, and larger work at a flame heat, does not know the manner in which his predecessors forged an intersecting grating wherein every bar has a twist and then goes through another bar. From 1300 to 1600, and even later, the smith worked $\frac{1}{8}$ rods as if they were merely wire: the several heats being known as sparkling, or welding, heat when he bent the iron or welded two pieces together; flame, or white, heat when he forged the metal into form and size; and blood-heat when he lightly hammered a bar to make it smooth and fit for the file.

After iron-work was finished it received colour by various processes; white, by cooling it in sal ammoniac mixed with quick-lime: black, by putting the metal into the fire with animal horn: the work was cleansed of any black scurf by friction with grindstone or whetstone; and heated through a light and dark gold colour to a blue. For the latter, some smiths rubbed the heated work with a woollen rag covered with indigo mixed with olive oil, and then left the metal to cool of itself. Vinegar is recommended in chapter 62 of Jousse, *La fidèle Ouverture*

de l'Art du Serrurier, fol., Paris, 1627, who in chap. 12 details several modes of brazing or joining together pieces of iron by means of what he calls *lâton*, i.e. latten or brass. The regret which is expressed by Jousse, vii, that Biscornet had carried to the grave the secret of melting iron and running it into moulds like other fusible metals, appears from SAUVAL, *Histoire*, fol., Paris, 1724, iii, 43, to arise from the fact that the smiths of their time believed that the hinges of the two side doors to the western front of the cathedral at Paris were cast in the fifteenth century by the two-horned fiend.

The smith's work of the seventeenth century consisted chiefly of the bar, the scroll, and the chased sheet; during this period the cost of the labour would seem to have become greater than that of the material; the sizes of the iron ran in twelfths of an inch, plate iron was $\frac{1}{2}$ or $\frac{1}{4}$ by various widths, and sheet iron about $\frac{1}{8}$ in. thick. D'AVILER, *Cours*, 4to., Paris, 1691, p. 217, mentions that it was economical to purchase bars which, when used as tie-rods, would only require to be forged at the hook and eye. This book contains in pl. 65d, one of the earliest illustrations of a *balcon de fer fondu*; he also notices that, for some time, small works in iron, such as furniture for the largest doors, were sold wholesale: and while allowing the advantage of having only to fix them, he indicates that the patterns were not so likely to be suitable as if made by hand; but he confesses that the smiths themselves generally adopted the expedient, and sold the articles retail as if made entirely by them, although they had perhaps only finished, or perhaps had slightly altered them. The same author, in his *Dict.*, s. v. Fer, intimates his acquaintance with cast iron in the passage "*fer fondu se dit non seulement du fer dont on moule des conduites, poêles, contrecœurs et autres ouvrages; mais aussi de celui qui, étant fondu, peut estre réparé avec des outils, tels que la lime et le ciseau (ce qui est un secret particulier qui, ayant esté perdu, a esté recouvert depuis quelques années) et dont on fait des balcons*," etc.: and besides giving the information that down-pipes had already been made of cast iron, he allows that cast iron backs and covings to chimneys were derived from England, and states that cast iron stoves consumed less fuel than those made by the potter.

In the first half of the eighteenth century the English smith used for articles of ornament the first iron that ran from the ore, which was always preserved for making wire; and *Swedish iron*, which best endured the hammer and was softest to file. He employed *Spanish iron* for large articles, as anchors, anvils, and thick bars; but although it was a tough and soft iron, many workmen refused it because it was so unevenly wrought in the bars that it cost them much labour to smooth it, and because it was subject to *red-sear*, i.e. to crack between heat and cold, and therefore needed to be carefully tended at the forge. The German bars, called "*Dort-squares*", $\frac{1}{2}$ in. square, were employed, like English iron, for window-bars, fire-bars, and other ordinary uses. The file was used "if the curiosity of the work required it."

It was known in 1788 that the inferior ores, when mixed, produce a metal better than any one of them: and as the pure cast iron cannot be cut or filed, there are three conditions of iron. Intermediately between the cast and the completely forged states, some metal cannot be worked either as steel or as iron, while other metal at that point is a good steel: some ores give a brittle metal, which no amount of forging will render perfectly malleable. Pure well-forged iron is malleable, whether cold or hot, though not with equal facility: some sorts of iron, which while cold are malleable, prove brittle when heated; others are brittle when cold, and malleable when heated: the former being called '*red-sear*' or '*red-shore*', the latter '*cold-sear*' or '*cold-shore*'. The imperfection of the first was attributed to the presence of sulphur, but of the second to insufficient forging. The statement that iron shrinks in fusion but swells in cooling, is supposed to have been first published by FERCHAULT DE RÉAUMUR, *L'art de convertir*

le fer forgé en acier; et l'art d'adoucir le fer fondu, ou de faire des ouvrages de fer fondu aussi finis que de fer forgé, 4to., Paris, 1722. Iron, when perfectly malleable, was considered not to be fusible without additions or without contact with the burning fuel: RÉAUMUR found that forged iron which would not melt in a crucible without addition, was brought into fusion by surrounding it with gypsum or plaster of Paris; and iron thus melted proved very malleable. Pure cast iron, if surrounded with animal ashes and exposed to a fire insufficient to melt it, becomes by degrees so soft that ornaments made of it may be cut or filed. When strongly heated, the surface of iron appears to be covered with a soft vitreous matter like varnish; in this state pieces of it cohere; so that, as before noticed, in welding, the lower piece is brought to a red-heat, the upper to a white-heat. Both gold and copper are good materials for insertion between two pieces of iron that are to be joined at a low heat, as they melt sooner than iron: the operation is called '*brazing*'.

WYATT, *Metal-work*, fol., London, 1852, p. xviii, offers the following criticism of the work of the intermediate period: "Specimens of the happiest treatment and execution of iron *grilles* and *gates* may be met with in the rich and flowing lines of scrolls and flowers worked in wrought iron, decorating the entrances to many buildings of the days of queen Anne and the two first Georges,—evincing an ambitious assumption of the main features of the style it decorated;—not stealing here a molding from stone and there an ornament from wood, all bedaubed with a green and copper imitation of bronze, but exhibiting the proper and distinctive treatment of a subservient material ornamenting buildings, with the architectural character of which it assimilates, yet does not interfere. Many specimens of this elegant style of railing, etc., about the old and quaint habitations of our old English gentlemen, and more especially at Hampton Court, Oxford, and Hampstead, still attest the surprising dexterity of the smiths they must have employed. With some modifications, this style may be said to have predominated from the reign of Elizabeth to the end of that of George II." But the student should be reminded that it is possible that much of the heavier portions of such iron-work was cast: the citations above given justify the suggestion that the smiths worked upon castings; and, after the lapse of a couple of centuries, it is difficult to discriminate, through the injury produced by rust, the difference between cast and wrought iron-work in external decoration. Although the railing for S. Paul's churchyard, London, was cast at Lamberhurst in Sussex about 1698, this was a work on a scale so great as to astonish the country; and it certainly does not appear that cast iron railings were usually made in England before 1703, but they are mentioned in 1734.

In the *Description des Arts et Metiers*, DUHAMEL DU MONCEAU, *L'Art du Serrurier*, fol., Paris, 1767, mentions the purposes to which wrought iron was then applied, and exults that the smith could repeat (often with greater lightness) in iron almost anything that the sculptor or the cabinet-maker could produce in wood: he says "*quand on n'épargne point la dépense, on voit des moulures poussées aussi net que si elles l'étoient sur le bois, des couronnements de grilles remplis de feuillages, de rinceaux, de fleurons, de couronnes, d'écussons, même de figures d'homme et d'animaux*." He mentions the manufacture of small screws and of wrought iron sashes; the manner of putting together the framework for the lead lights of windows in churches; the mode of hammering iron into single or double molded anvils, as superseding the old system of riveting one bar upon another to get the section desired; and notes that iron bars had been rolled between cylinders in a machine designed by Choplal, but destroyed at his death.

Having thus arrived at the condition of ornamental iron-work at the middle of the eighteenth century, this article might be terminated with a notice that the subsequent demand for cast iron was the natural result of its price being less than

that of wrought iron, especially if undercutting was avoided; that many articles which could not be fabricated by hand at any reasonable price, were made of cast iron; and that time was saved by using a pattern for castings, a number of castings could be delivered sooner than two wrought iron copies. Hence resulted the extinction of the race of artist-smiths: in one generation the designer dealt with them, and in the next with the clever carvers who acted as pattern-makers. In a succeeding period the designers found that occupation for themselves was scarce, for piracy became frequent: and as often as they produced something that was attractive, they lessened their own employment. Their place was taken by architects without any means of prosecuting those manufacturers who, having cast a certain quantity of work from a pattern finished to suit the design supplied by the architect, charged the carver's bill and when the amount was paid retained a casting from which they supplied any one who admired the design. The Act for the Registration of Designs assisted to stop this piracy, but more effectual was the desire to resuscitate the use of wrought iron. The result, in the Medieval and Renaissance styles, was sufficiently marked in the years 1851 and 1862 to need no further notice in this paragraph.

In addition to the works above named, are:—*FORDRIN, Lièvre du Serrurier de composition Angloise—exécutes à Londres*, fol., Paris, 1723; *BONNOT, Détail général des fers, fonte, serrurerie, etc., à l'usage des bâtimens*, 8vo., Paris, 1782; *CORTINGHAM, Smith, Founders', etc., Director,—designs for grates, piers, railings, etc.*, 4to., London, 1823; *LINE, Designs for Ornamental Metal Work*, 8vo., London, 1834; *PUGIN, Designs for Iron and Brass Work, XVth and XVIth cent.*, 4to., London, 1835; *SHAW, Examples of Ornamental Metal Work, collected, and partly designed*, 4to., London, 1825, 1836; *LA-MOUR, Recueil de Serrurerie—place royale de Nancy*, fol., Nancy, 1767; *WEALE, Ornamental Iron Work; Gates, etc.*, fol., London, 1840; *WELLDON, The Smith's Right Hand, or a Complete Guide for all sorts of Iron Work*, 3 Parts, being *Designs for Stoves, Rails, Brackets, etc.*, 8vo., London, 1765; *LECONTE, Choix de nouveaux modèles de Serrurerie*, fol., Paris, 1838; *ROYAL FOUNDRY OF BERLIN, Magazine of Designs executed*, fol., Berlin, 1833; *SCOTT, Ornamental Designs for Brass, Iron, Glass, etc.*, fol., London, 1852; *KING, Orfèverie et ouvrages au Moyen Age*, 2 vols., fol., Bruges, 1853-60; *TJOU, A New Booke of Drawings, invented and designed by J. T.; Ornamental Iron Work; Gates, fol.*, London, 1693; *RORET, Encyc.—Manuel du maître de forges*, par Landrin, 18mo., Paris, 1827-9; *BORDEAUX, Serrurerie du Moyen Age*, 4to., Paris and Oxford, 1858; *CLARKSON, Ancient Iron Work from the XIIIth century*, fol., London, 1860; *GEISS, Ornamental Sculpture, etc.; pattern book*, 4to., Berlin, 1850 (?); *BURY et HOYAU, Modèles de Serrurerie*, fol., Paris, 1826; *HOYAU, L'art du Serrurier*, fol., Paris, n. d.; *THIOLLET, Modèles de Serrurerie*, fol., Paris, n. d.; *LACHAVE, Serrurerie; Balcons en fer corroyé et d'autres en fonte, etc.*, fol., Paris, 1864 (?); *NORMAND, Œuvres de Serrurerie*, fol., Paris, 1824; and *Le nouveau traité de Serrurerie*, 40 pl., Paris, n. d. A short historical outline is given in *BUILDER Journal*, 1853, xi, 424, with the gates of Luneburg town hall. *AITCHISON, Iron as a Building Material*, read at the Institute of British Architects 29 February 1864; and *WHITE, Ironwork; its legitimate Uses and Proper Treatment*, read 20 November 1865. *Illustrations*, s. v. Font Cover, Grille, Metal Work; and *Detached Essays*, Hipknob, and Ridge.

IRON YELLOW (Fr. *jaune de fer*, or *jaune de Mars*) A bright iron ochre colour, prepared artificially, of the nature of Siena earth. The colours of iron exist in endless variety in nature, and are capable of the same variation by art, from Siena yellow through orange and red to purple, brown, and black, among which are useful and valuable distinctions, which are brighter and purer than native ochres. *FIELD, Chromatography*, 4to., London, 1835.

ARCH. PUB. SOC.

IRUN, a town in Spain, see *HURTADO DE LUNA*.

IRXLEBEN (HANS) made 1453 the design for the tower of the Johanneskirche at Magdeburg. He is called Irxing in *NAGLER*. 92.

ISACOUSTIC or **ISEIDOMAL CURVE**, that is, a curve of equal hearing or seeing. This curve was obtained by *SCOTT RUSSELL*, as related in the *Edinburgh New Philosophical Journal*, 1839, xxvii, for the purpose of arranging the interior of a building for public speaking, so that within the whole range which the voice of a man is capable of filling, each individual should see and hear without interruption from any of the audience, with equal comfort in an easy posture, and as clearly as if no other auditor or spectator were present. To draw this curve, it is first necessary to fix the position of the speaker, and to decide how much of his voice and sight each auditor should have; about 18 ins. high and 3 ft. from back to back, is generally sufficient. Then drawing a series of radial lines from the mouth of the lecturer to points decided by these dimensions, a curve is obtained for the rise of the seats, which is found in practice of good effect. The means in detail for obtaining this curve will be found further described in *GWILT, Encyc.*, § 2953-2961; *LACHEZ, Acoustique*, etc., 8vo., Paris, 1848, pp. 111-3; *T. R. SMITH, Acoustics of Public Buildings*, 12mo., London, 1861, pp. 42-7.

ISCA DUMNONIORUM of the Romans, see *EXETER*.

ISERNIA. A city in the province of Molese in Southern Italy. It consists of one long and narrow street, partly enclosed by the remains of some mediæval walls and semicircular towers. The cathedral, dedicated to S. Pietro, had replaced before 1845 that destroyed 1805 by an earthquake. In the city are also an old round church of SS. Cosmo e Damiano; two monasteries; a nunnery; and a seminary. There is also a mass of building with a mutilated statue at each angle, which is assumed to have been a Norman gateway; and a fountain with six arcades rising from columns of white marble; this, like the rest of the town, is supplied by water conveyed through a tunnel cut in the living rock for so long a distance as to require six air-holes (*spiracoli*), the deepest being 82 ft. 9 ins. 28. 96.

ISENBERT of Xaintes in France, was recommended 1201 by king John of England, to the mayor and citizens of London, to finish the stone bridge, commenced in about 1176 by Peter of Colechurch, who died 1205; it was completed 1209. The king describes him as "our faithful clerk Isenbert, master of the schools at Saintes, a man distinguished both for his worth and learning, by whose careful diligence the bridges of Saintes and Rochelle had been, under Divine providence, in a short time constructed." The letter is dated 18 April, in his third year, at Molineux in Normandy. The king granted the profits of the edifices, which Isenbert intended to erect on the bridge, to be for ever applied to its repair and sustentation. In another document relating to the bridge at Saintes, he is called "our most dear and faithful Isenbert"; and mention is made of the houses built on that bridge, which had been given to the inhabitants of Rochelle by Isenbert, apparently at an annual quit rent of 5s. for the repair of the bridge, and which the king confirms to them, directing the quit rent to be applied to needful repairs, "and to lighting the bridge by night according to the plan of the same master of the schools." *HARDY, Descr. of the Patent Rolls*, 8vo., London, 1835, p. 67; and *Close Rolls*, 1833, pp. 49, 167; *HEARNE, Liber Niger Scaccarii*, 8vo., London, 1771, p. *470; and *AYSCOUGH and CALEY, Cal. Rot. Pat. Turri Lond.*, 1802, both print the king's letter, also copied from the roll, in Harleian MSS., No. 86, p. 1; *THOMSON, Chronicles of London Bridge*, 8vo., 1827, and reprint, 12mo., 1839, p. 53; who concludes, "It is, however, by no means clear,—that Isenbert was employed by the citizens." *NOTES AND QUERIES Journal*, 2nd ser., ix, 119, 254.

ISERNE. An Anglo-Saxon word used in the tenth century for IRON.

ISERNODURUM. The Latin name of a place now called

Isernore, situate between Mantua and Bellegarde, in the department of Ain in France. It contains the remains of a building, supposed to have been a temple of the Corinthian order dedicated to Mars. The cella was nearly square, and stood, like the portico that enclosed it, upon a high stylobate. Each angle of the peristyle was formed by a pier with two engaged columns; and remains of three of them show that the astragal of the capital was 30 ft. 3 ins. from the ground, that there were four columns in front and in rear with five on each flank, between the piers, that the diameter of the columns was rather more than 2 ft. 5½ ins., and that the whole was 71 ft. 10 ins. long by 62 ft. 4 ins. wide on the piers. A view of this remarkable work is given in NODIER and TAYLOR, *Voy. Pitt.* (Franche Comté), fol., Paris, 1825, pl. 46, with a plan and details, pl. 50 bis.

ISIDORUS (Gr. Ἰσίδωρος), a native of Miletus, is said to have died while engaged in the erection 532-7 of the church of the Sta. Sophia at Constantinople, which was finished by his colleague ANTHEMIUS. The epithet *μηχανοποιός* is given to them by PROCOPIUS, *De Edif.*, i, 1, and ii, 3.

ISIDORUS of Miletus, was a nephew of the above named, from whom he is sometimes distinguished by modern writers as "the Byzantine". The epithet *μηχανοποιός* is applied by PROCOPIUS, *De Edif.*, ii, 8, to him and to Joannes of Byzantium his colleague in erecting Justinian (527-565), in the city called Zenobia on the western banks of the Euphrates, the baths, and public porticos, if not also the churches, barracks, and fortifications. There does not appear to be any ground for the assertion, that these works were designed by the uncle, or that the nephew rebuilt the dome and made additions to the interior of Sta. Sophia after the earthquake in 554.

ISIS. The temples to this Egyptian deity are not numerous, and were probably not dedicated to her alone, but also to her husband and child. Thus there was the triad of Osiris, Isis, and Horus, in the sanctuary at Dandoor; as was probably the case in the Ptolemaic temple at Anas el Wogood (PHILE); Serapis and Isis were worshipped at Cysis now Doosh. The granite ruins of a Ptolemaic temple at Bebayt el Hagar, between Cairo and Damietta, mark the site of a temple so exclusively devoted to her worship, that the town itself was known as to the Greeks as the Iseum. A very complete example of a temple to Isis exists in that, at Pompeii, given in COCKBURN and DONALDSON, *Pompeii Illustrated*, fol., London, 1827, p. 43-4, pl. 78-80.

ISLAMBUL, or STAMBOUL, see CONSTANTINOPLE.

ISLE. An old way of writing AISLE or AILE.

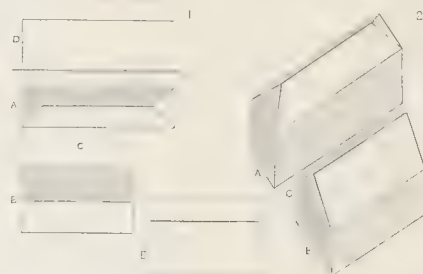
ISLE (J. C. GARNIER DE L'), see GARNIER (J. C.).

ISLE (PASQUIER DE L'), see DELISLE MANSARD, and LISLE (PASQUIER DE).

ISODOMUM (Gr. ἴσος equal, and δόμος construction). A term applied by VITRUVIUS, ii, 8, to a species of Greek masonry. His words are, "the construction of the Greeks is not to be contemned: for they not only use polished stones of soft material, but when they depart from squared work (*à quadrata*) they make an ordinary (*i.e.* structure) of hard stones; and thus, as if building brick walls, they bond their joints together in alternate courses, and thus ensure firm strength in perpetuity. This they built in two methods, one of which is called *isodomum*, the other *pseudisodomum*. *Isodomum* is so called because all the courses are of equal thickness; *pseudisodomum* when the ranges of the courses (*ordines choriolum*) are unlike and unequal (*impares et inequales*)."
Impar probably means no pair, or no two alike, in length, and perhaps no two courses alike in depth. *Isodomum*, or equal coursed work, would therefore probably mean masonry where all the courses are of equal depth, but the perpenders are not regarded. *Pseudisodomum*, or false coursed work, would mean masonry of level courses, but each course varying in depth. PLINY, *H. N.*, xxxvi, 22. Many examples of this kind of work will be found in DENNIS, *Cities, etc., of Etruria*, 8vo., London,

1848, where, i, 106, etc., he is evidently wrong in calling it EMPECTON. A. A.

ISOMETRICAL PERSPECTIVE. A method of exhibiting a bird's-eye view of any object (particularly buildings) which, though unsatisfactory to the eye, and it must be admitted also to be false, possesses the advantages of being easy and simple. In this method parallel lines are not made to radiate to vanishing points as in artistic perspective, but they are all drawn parallel to each other, and consequently the sizes of equal objects do not diminish as they recede or become more distant. As the derivation of the name imports, equal objects are delineated of equal sizes in whatever part of the picture they may be, and the distances from each other, the heights, frontages, etc., may all be taken from the same scale.



To elucidate the method shortly; let *A. B.*, fig. 1, be the plan of two blocks of buildings, and *C* a space between them, and *D E* the respective elevations; one being hipped, the other gabled. Lay down the plans at any convenient angle, and set up the heights from the elevations as shown in fig. 2. The plain lines exhibit the parts which will be visible, the dotted lines those concealed by the view, or requisite to show the manner of constructing it. A very small knowledge of geometrical drawing will be sufficient to carry out the method to any extent. BIRD'S-EYE PERSPECTIVE; DIAGONAL VIEW. A. A.

Attempts at this method are frequent, even as early as in monastic manuscripts, but the present system is said to have been matured by Prof. Farish, and is explained in the *Transactions* of the Cambridge Philosophical Society, i, about 1823; FARISH, *Isom. Persp.*, 8vo., Cambridge, 1820; reprinted in GREGORY, *Mathematics for Practical Men*, 8vo., London, 1862, p. 96-106, 4th edit. Some useful exemplifications are given in MECHANICS' MAGAZINE, xviii and xix: JOPLING, *Practice of Isom. Persp.*, 8vo., London, 1835; BRADLEY, *Practical Geometry*, etc., 8vo., London, 1831; SOPWITH, *Treatise on Isom. Drawing*, 8vo., London, 1834.

ISONANDRIA GUTTA, called *niato*, supplies GUTTA PERCHA.

ISPAHAN (perhaps the Aspadana of the Greeks, and probably situated near the site of ECBATANA). It was the capital, until 1722, of Persia but now of the province of Irak, and still one of the most interesting cities in Asia. It is built on the left bank of the river Zend-rud, over which are four bridges leading to the Julfa and other suburbs. Its extent was more than a rider could well travel round in a day, because almost every house had its own garden (which was supplied with water by pipes from the river); thus the narrow, tortuous, and unpaved streets were flanked by long lengths of fence-walls built with sun-dried bricks; the citadels and fortifications being of the same materials. The town is now four times too large for its population; and, on the right bank especially, whole streets have been totally abandoned; while, on the left, about two miles in length of covered bazaars are almost equally deserted. There are, however, many remains of the splendor described 1686 by CHARDIN, whose account is more minute than any recently given by his countrymen.

The celebrated Julfa bridge has thirty-three arches which carry the roadway with a double gallery of seventy arches on each face on each side of the road: these galleries are covered, and the partition, running as high as the roof, is pierced by doorways at intervals, so that a passenger can quit the throng and rest to gaze on the river, or descend to the water. The Pul Kadjouk, having two galleries of arcades with three pavilions on each side and steps to the water, with a roadway only 6 ft. above the level of it, is shown in CHARDIN, pl. 48, as the bridge of Shiraz. The bridge of Julfa or of Ali Verdi Khan, the general of Abbas Shah, is given in FLANDIN, pl. 46, and that called by him Kadjiou, pl. 47; the latter is termed Pul-Hajou and Pul Barbarouk by MORIER, *Second Journey through Persia*, 4to., London, 1818, pp. 130-51, whose view of the dove-cotes of the villages decides the object of these buildings, sometimes not so clearly described: he also shows the shaking towers at Guladoun in the western environs. In pl. 64, FLANDIN gives a view of a ruin, one of the numerous palaces and mosques with which the nobles decorated a favourite spot called Sheheristan, to the eastward of the city.

The great square, the *maidan shah*, is a space about 1470 ft. long by 498 ft. wide, enclosed by shops in two stories of arcades two rooms deep: eighty-six arches in each range form the long side, and thirty fill the short one, the centre of each side being occupied by public buildings; viz. on the south-west by the Ali (*capi*) gate, on the north-west by the gate leading to the principal bazaar and the town, on the south-east by the entrance to the Masjid-shah, and on the south-west by that to the mosque of Loutf-Oollah. A view of this square in FLANDIN, pl. 54, shows the Masjid-shah, pl. 55 the entrance to this great mosque, and pl. 56 its inner court; TEXIER, pl. 69-72, gives a plan, elevation, and section of this structure, which was built by Abbas the Great 1612-3, and is covered with glazed tiles having generally a pattern on a blue ground, upon brickwork according to TEXIER, who does not state whether the bricks are sun-dried or burnt; some travellers insist that the palaces and mansions (and therefore probably the mosques and colleges) are of stone: the construction of its dome would be somewhat difficult to describe if TEXIER had not confessed that he had not studied in some ruins the exact manner in which the inter-dome was occupied by a central post with struts having one end worked into the cupola. Similar tile decoration is shown in his pl. 76-78, being a view, plan, and elevation of the *medresseh* or school of Shah Sultan Hossein, built about the year 1730. Views are given by FLANDIN, pl. 41, of the mosque Baba Souctah, showing the thin minaret deprived of the veranda to the gallery; pl. 48, views in the garden of the mosque of Shah Sultan Hossein 1694-1732; pl. 49 the entrance to its *medresseh*, with pl. 50 and 61 the mosque itself; pl. 60 the mosque of the Hesht Beheht or Eight Gardens, and some of the tombs in the environs of the city; with pl. 53 the cemetery; and pl. 52 one of the thirteen churches in Julfa once belonging to the Armenians who were originally brought from Julfa on the Araxes by Shah Abbas.

Of the palaces, nine in number, the finest is the Chel-Sitoun, or Forty Pillars, given in pl. 51 of FLANDIN; like the others it stands in a square once intersected by canals and thickly planted. The front is one great veranda with an elaborately ornamented ceiling supported by a double range of pillars more than 40 ft. in height; they are similarly decorated and each rises from a base consisting of four lions of white marble. This white marble is the so-called marble of Tabriz, according to MORIER, *Journey through Persia*, 4to., London, 1812, p. 278, a diaphanous petrification found in large blocks in great quantities on the borders of Lake Shalce, used for baths, lining to walls, tombstones, etc., at Ispahan. The Chehar-bagh or Four-gardens palace; the hall of the Kalvet Serpouchideh, also called Amarat-Serpoucht, the most recent of these buildings (*i. e.* after 1797); and the palace called by him Hapht-Dest, are given in pl. 57, 58, and 62 of FLANDIN, whose

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illustration, pl. 43-44, of the kiosk of Eynah Khaneh (the hall of mirrors) must not be supposed to be meant for the palace so named. The names of the other palaces, with a slightly different account of the town, will be found in FRASER, *Historical, etc., Account of Persia*, 12mo., Edinburgh, 1834, pp. 47-56.

The interior of the bath of Khosrou-Aga, pl. 45; with a gateway to a caravanserai, pl. 59, complete the picturesque representation given by FLANDIN, whose text, i, 335-58, ii, 1-56, contains a good description of the Persian flat-roofed house, which has the advantage of not needing a staircase. A Persian house is given in TEXIER, pl. 79; and two views of the city by FLANDIN, pl. 40, with a view of the avenue of the Chehar Bagh or Four Gardens, pl. 61, in which he has attempted to show the character of foliage of the *chenar* (or plane) tree, and to give an idea of this avenue, planted 1597-8 with double rows of trees and flanked by mansions in gardens, somewhat like the Champs Elysées of Paris: it extends for about a mile from one end of the Julfa bridge.

The gradual decay of Ispahan is marked by the accounts in CHARDIN, *Voyages* (edited by Langlois), 8vo., Paris, 1811, vols. vii, 273-492, and viii, 1-161; BELL, *Travels from St. Petersburg*, 4to., Glasgow, 1763, i, 118-21; R. K. PORTER, *Travels in Georgia, etc.*, 4to., London, 1821, i, 411-41; TEXIER, *Description de l'Arménie*, fol., Paris, 1842, ii, 112-39; FLANDIN and COSTE, *Voyage en Perse*, fol., Paris, 1851; and CHESNEY, *Expédition*, 4to., London, 1850, i, 214-5.

ISSASI (FRANCESCO DE), a Jesuit, made 1646, together with Ignacio de Ausola, the designs for the chapel and the tower of the parish church at Eybar, in the province of Guipuzcoa, in Spain. 66.

ISTAMBUL or STAMBOUL, see CONSTANTINOPLE.

ISTRIAN STONE, has a fine, close texture, and good colour, and is raised in large masses without much fault in them. The quarries on the island Brioni, outside the port of Pola, have for centuries been worked to supply material for the buildings at Venice; and from the ancient quarries of Roman Pola, on the main land, that immense block was raised, it is stated, which still covers the rotunda at Ravenna—the so-called sepulchre of Theodoric. The columns of the temple at Pola are of a variegated marble much resembling that called Cipolino; NELSON, *Antiquities of Pola*, in *Transactions of the Royal Institute of British Architects*, 7 April 1851.

ISURIUM of the Romans, see ALDBOROUGH in England.

ITACOLUMITE. A laminated granular quartz rock, pertaining to the talcose series, and owing to a little talc or mica the lamination which allows it to bend: this rock is found in the diamond mines of Brazil and the Urals; and also in Georgia and North Carolina: DANA, *System of Mineralogy*, 8vo., New York, 1854, i, 24. A piece from Cawnpore is in the collection of the Royal Institute of British Architects. FLEXIBLE STONE.

ITALIAN ARCHITECTURE. These words are employed with two meanings: viz. the architecture of Italy; and the architecture invented by the modern Italians: the latter, though included in the former, will be considered separately at the end of the following articles.

The *architecture of Italy* may be classed under four divisions: first, the antique, ETRUSCAN; GREEK; and ROMAN: secondly, the middle period, Byzantine; Saracenic; and ROMANESQUE; on each of which a few words will suffice: thirdly, the mediæval, ITALIAN POINTED: and fourthly, the modern, Neo-classic, including the *Risorgimento* (CINQUE-CENTO) and its development into the ITALIAN STYLE.

With regard to the first of these divisions, it is only necessary to observe that it is now becoming usual to speak of it, as in the words of FERGUSSON, *Illustrated Handbook*, 8vo., Lond., 1855, p. 299, who says that "the earliest inhabitants of Rome were an Indo-Germanic race, who established themselves in a country previously occupied by Pelasgians. Their principal neighbour on one side was Etruria, a Pelasgian nation. On the other hand was Magna Græcia, which had been colonised

in very early ages by Hellenic or Indo-Germanic settlers. It was therefore impossible, that the architecture of the Romans should not be in fact a mixture of that of these two peoples. As a style of transition it was only a mechanical juxtaposition of the two styles. The real fusion took place many long centuries afterwards. Throughout the Roman period they remain distinct, and there is no great difficulty in referring almost every feature to its origin." In accordance with this passage, every semicircular arch erected by a Roman between the Euphrates and the Atlantic, every vault, and every true dome, evinced the native (Etruscan) spirit; while each successive instance of their combination with any of the orders used by Greeks, marked a step towards a new and complete style: these orders having most importance in the age of Augustus, but becoming subordinate ornaments in the time of Constantine. Although there may be found, here and there, a structure not encumbered by them (such as an aqueduct or a tomb), the orders were still an essential part of Roman art, because the universal abolition of them can hardly be said to have occurred until the end of the eighth century, contemporaneously with the conquest of the Lombards by Charlemagne. The same author, p. 363, insists that one curious point, which has hitherto been too much overlooked in the history of architecture as practised in Italy, is that in Pompeii there are three styles of decoration. One of these is purely Etruscan in form and colour; another is equally Greek in those respects; the third suggests that a style of Roman art once existed, which resulted from the employment of metal for the principal features, and which was neither Etruscan nor Greek in character, but had more connection with the latter than with the former. This Romanised variety of Greek decoration, visible in the baths of Titus, is noticed in a manner which shows that it was practised in the time of Theodoric (493-526), (according to the opinion of FERGUSON, who does not cite any passage as authority but probably means CASSIODORUS, *Var.*, vii, 15): its elements may be seen collected in CANINA, *Particolare Genere di Arch. Dom. decorato con Ornamenti di stelle Ferme*, fol., Rome, 1852, pl. 10-24: the allusion to it by VITRUVIUS, vii, 5, seems decidedly against any argument that such a method of building was practised at Rome.

Some allusion ought to be made to the supposition that, in the country between Etruria and Magna Græcia, a local style must have existed, from the earliest period at which that large district could have had any architecture, until the introduction of Greek art into the capital of Italy. The probability of the existence of this fourth of the ancient styles in that country seems to have been first intimated by J. W. PARWORTH, Prize Essay, *On the Adaptation and Modification of the Orders of the Greeks by the Romans and Moderns*: an abstract in the *CIVIL ENGINEER*, etc., *Journal*, 1847, x, 83, intimates that this author repudiated the so-called Etruscan vases as evidence of the architectural acquirements of the Etrurians who, in his opinion, exercised little influence on the early style of the Romans; this style being Alban or Latin, either term being used to denote the simplest order of classic architecture which was gradually superseded in Rome by the Ionic and the triglyphed Doric; these productions of Hellenic art, when introduced by Cossutius to Rome, being corrupted by the influence of the local style. The passages in VITRUVIUS, and the existing remains, which afford support to that argument, will be considered *s. r.* OSCAN STYLE.

From the valuable delineation of the periods of the low state of art in Italy made by CORDERO, *Dell' Italiana Architettura*, Svo., Brescia, 1829, in correction of several passages relating to the subject in the text of SERRON D'AGINCOURT, *Histoire de l'Art*, fol., Paris, 1823, the following epitome of those stages is derived. In the time of Septimius Severus 193-211 there was evidently a depression, which increased under Gallienus 254-68. The next stage, commencing with the accession of Diocletian 284, includes the sway of the

Heruli 476-93 and of the Ostro-Goths 493-552, and ends with the Greek rule of Narses 552-68. The Lombards were dominant in Italy 568-772. After this came the Carolingian transition, which is at some times counted as a stage of Roman art, at others as the earliest form of Romanesque. The examples, of a new style, furnished by Diocletian at Rome and at Spalatro, did not soon have many imitators except at Ravenna: those were the first instances of the introduction into Italy of oriental modes of design in construction and in decoration; through which groined vaulting became common, entablatures ceased to be essential, arches were allowed to spring directly from capitals of columns, and a profusion of ornament was thought to be necessary to perfection. During the rule of the Goths and of the Lombards, Italy south of Tuscany was nominally subject, as the exarchate of Ravenna was subject, to the emperor of the East. Under the government of the Lombards and the Greeks, which forms the last period of Roman Art, architecture was reduced to a servile and imperfect imitation of older works, and was in fact merely construction. But CORDERO insists that it still preserved some portion of antique dignity, and refuses to see barbarism in times, however poor or corrupt or decayed, that produced the Italian buildings erected in the *secoli di mezzo fra l'uno e l'altro impero*; i.e. between the reigns of Constantine and Charlemagne. In a list of a few buildings that he considers were undoubtedly erected during the fourth, fifth, and sixth centuries, he (p. 105-6) places the basilicas attributed to Constantine 306-337, viz. that of Sta. Maria Maggiore, the destroyed church of S. Pietro in Vaticano; that of S. Paolo fuori delle mura; the round churches of Sta. Costanza, and of S. Stefano, on Monte Celio; the churches of S. Martino ai Monti, and of Sta. Sabina, at Rome; p. 64 the baptistery of S. Giovanni in Fonte, cc. 450; the palace and tomb of Theodoric 493-526; the Byzantine church of S. Vitale, and p. 66, the Roman church of S. Apollinare in Classe, both begun cc. 523-526 at Ravenna; and the baptistery of S. Giovanni at Florence, using p. 202-3 some remarkable arguments in favour of dating it in the fifth or sixth century, especially the retention of the architrave. He considers that in these structures the large number of windows and their great width in proportion to height, e.g. 10, 12, and even (in S. Vitale where they are divided by a muntion) 16 to 16, are infallible marks by which to distinguish these buildings from others erected in the ninth and tenth centuries (in the *primo stilo del gotico antico*) but otherwise very similar. In churches a level floor throughout the nave as far as the apse is to him another indication of early work. And he notices p. 218-25 that such windows are in the church of S. Frediano commenced 686 at Lucca; but p. 261 not in that of S. Michele built before 761: both these buildings will be again noticed in the next (their proper) period. In buildings erected under the Goths and the Exarchs, it is to be remarked that arches are constantly made to spring from a cushion, cymatium, or gula, on the capital of a column, this compensation for the abolition of the architrave is quite a Byzantine feature; first appearing in Italy at Ravenna, in the churches of S. Vitale, S. Apollinare in Classe, etc., it soon became common, and is seen at Rome in the churches of Sta. Costanza, S. Lorenzo, and S. Stefano Rotondo; at Rimini in the church of S. Gregorio; at Perugia in that of S. Angelo; at Parenzo (Istria) in the cathedral; and elsewhere in structures that belong to the fifth and sixth centuries. But there is probably no example of such a die in Italy from the sixth to the fifteenth century, in which last period it was used by the Florentine masters; as in the basilica of S. Spirito, where it is an entablature, and in the loggia dei Rucellai. The church of S. Apollinare in Classe, which was begun about 523-6 at Ravenna but scarcely finished at the period of the Lombard invasion, is a fair companion to the basilica of S. Paolo fuori le mura at Rome, which was rebuilt about fifty years after the death of Constantine: this degenerating Roman architecture was continued in Italy (except at Ravenna) during the sway of

the Lombards, who had no peculiar style of their own; and furnishes the last period of classic art. Among the buildings of this era at Rome may be named the basilica of Sta. Agnese fuori delle mura, dating about 650; and the basilicas of S. Stefano degli Ungheresi, of S. Michele in Sassia, of S. Pietro in Vincoli, and of S. Giovanni a Porta Latina, belonging to the eighth century. The works executed for the Lombard rulers are perhaps a few columns with *foliated* capitals of the basilica built c. 600 near her palace for Theodolinda at Monza; the basilica of S. Frediano commenced 686 at Lucca; probably the gateway called the palazzo delle torri ascribed by CORDERO to the eighth century at Turin; parts of the church (formerly cathedral) of SS. Giovanni e Reparata, older than 754, at Lucca; the monastery of S. Pietro ai Clivate in the district called Brianza in the province of Como 755; the desecrated church of S. Salvatore belonging to the monastery of Sta. Giulia 757 in Brescia; the church of S. Pier Somaldi, used 763, in Lucca; and the basilica of S. Michele in Foro before 764 in the same city. The rule of the previous period as regards the windows appears to have continued, but to tend towards narrowness: e.g. in S. Frediano the proportion is 5 to 16, but in S. Michele 3 to 15, and the latter has canted jambs. The extinction of Roman art was not completed until the destruction of the Lombard power by Charlemagne. Towards the end of the eighth century began that tendency to Orientalism which formed during his reign the transition, from Roman, to Romanesque otherwise called Lombard, art (seen perhaps in the old round cathedral at Brescia begun 789), out of which arose the *stilo primo del gotico anteriore*. This transition is at sometimes counted with the works of the Lombards, at others with the style of the ninth and tenth centuries, to which perhaps it properly belongs.

With Charlemagne began the *bassi tempi*, which can scarcely be understood without a slight notice of the political events of the period. When the Carolingian princes lost in 888 their power, Italy was a prey to the dissensions of the principal chieftains, such as the dukes of Benevento, Tuscany, and Spoleto, and the marquises of Ivrea, Susa, and Friuli: the pope ruled at Rome; Salerno, like Capua, was under its own prince; while the republics of Amalfi and Naples acknowledged the supremacy of the Catapan who governed Apulia and Calabria under instructions prepared at Constantinople. Between the years 936-1198 the Italian cities as far as Ancona and Spoleto became independent, reserving the imperial superiority; and during 1060-1127 the kingdom of Naples was formed.

The Saracens possessed (besides Sicily 827-878) settlements in Calabria before Nicephorus Phocas gave as a dowry c. 974 to Otto II of Germany, the rights and claims of the emperors of the East upon Lower Italy, where the Normans arrived 1029 at Aversa. Consequently there was a style in a portion of Italy which the author, who has thus far been followed, does not notice; properly SARACENIC in its earlier phase in Italy, and SICULO-NORMAN in the later time. The stamp of Saracenic art is impressed upon the cathedral at Trani, which is said by one critic to resemble very much in style the tombs near Cairo, and is one of the finest mediæval monuments in southern Italy; the monastery of S. Leonardo presents a very elaborate example of the Saracenic style in its church erected 1223; the Castel del Monte near Andria, unparalleled in Italy, and still perfect although abandoned, dates 1198-1250, and is in style both Arabian and Gothic; while the cathedral at Lucera was a mosque until the expulsion 1269 of the Saracens. The term *Saracenic* is too often loosely applied, and may mean *Byzantine*; for example, attention has been claimed to the remarkable Saracenic gallery at the west end of the cathedral at Genoa, executed during the alterations 1290-1312. Most other indications of Mahomedan settlements are upon the coasts, and not in the routes usually followed by architectural travellers. SICILIAN ARCHITECTURE.

From 814 to 1000 is the period to which CORDERO ascribes the *stilo gotico anteriore*, or *antico*; from 1000 to 1200 its

second period, or stage of transition; and from 1200 to 1500 the *stilo-gotico posteriore*, or *moderno*. The two first seem to have no better name than ROMANESQUE, although LOMBARDO is an epithet sometimes (and always very vaguely) applied to them. The last will be separately considered *s.v.* ITALIAN POINTED ARCHITECTURE, with which the third division in the list given at the beginning of this article commences. With regard to these divisions, but especially to the third, it is necessary to state that a traveller, who carries a list of *videnda* prepared from biographies and chronicles, is not likely in some parts of Italy to find a large portion of the works that may have been so indicated to him, to say nothing of the readjustment of the titles given to pagan structures. In some towns the number of ecclesiastical buildings has been reduced to less than half that existed in 1765 (and this great devastation has affected nearly all those wholly or partially Gothic): or an important structure has been abandoned and its name transferred to another in a distant locality, so that the possessors of the two sites issue their deeds from apparently the same place as their predecessors: or a palazzo or a villa has changed proprietors and has acquired a new name: or a fine church has been restored to its original purpose and is no longer known by the title which it had borne for fifty years: or the offices of the government have changed quarters, and maps with the new names are wanting.

The practice of Romanesque art continued with slight variations after Pointed art was as fully accepted, as it ever was in this country; and the *risorgimento*, Renaissance, or revival was begun by some of the TRECENTISTI from 1250, continued by the QUATTROCENTISTI, and developed as the pure *stilo cinquecento* before 1475. It may be useful to remark that these words *tre*, *quattro*, and *cinque* with *cento* are used to express the number of the hundred in the date of the year; thus Alberti (1404-72) belongs to the (*quattrocentisti*) men of the fourth hundred, while he also belongs to the (*secolo quindecimo*) fifteenth century. Bramante (1444-1514) and Andrea Sansovino (1460-1529) are considered as the leaders of the pure *stilo cinquecento*, which is supposed to have lasted until 1550, when it sank into the debased style of the Renaissance properly so called, and at last yielded to the *bizarre*, the *barocco*, and the *rococo*, at the end of the seventeenth century.

The preceding paragraph, although consonant with the views of many recent students of Italian art, requires to be accompanied by a sketch of the sentiments of previous modern writers with regard to the style which has been termed NEO-CLASSIC. The first stone of the duomo at Florence, laid 1248, is regarded as the foundation of the revival, and the movement itself is divided into three schools which almost simultaneously expired; viz. the Florentine 1400-1600, the Roman 1470-1607, and the Venetian 1500-1597 or 1520-1616; to them succeeded the school of masters, Maderno (1556-1629), Bernini (1589-1687), Borromini (the *bizarre* 1599-1667), Guarini (the *barocco* 1624-83), C. Fontana (1634-1714), the family of Galli Bibbiena (1637-1757 or later), Juvara (1685-1735), and Posi (1708-76); which was reformed by Galilei (1691-1737), Servandoni (1695-1766), Vanvitelli (1700-1773), Preti (1701-74) with his pupils the Miazzi, Pompei (1705-82), Dal Pozzo (1718-81), Bertotti-Scamozzi (1726 1800 or later), Morelli (1729-1812), and Calderari (1730-1803) whose level of correct mediocrity brings down the list to the time of the architects, who like the brothers Gasse (1778-1840), followed the taste fashionable in France, and who afterwards accepted the Parthenon instead of the Pantheon as the type of architectural beauty, when there was an opportunity of erecting any structure; such an occasion has been so rare that it might almost be said that during 1800-1850 there was scarcely sufficient employment except in the construction of theatres for one architect, even if all Italy had been under his charge. There is no one work upon the architecture of Italy; the publications which exhibit the various local styles are mentioned

in this Dictionary under the description of the several towns.

ITALIAN GARDEN. A plot of ground in front of a mansion or of one of its adjuncts, as a conservatory, laid out somewhat architecturally, by being formed of several plateaux at various heights, each separated by a dwarf wall or ornamented balustrading, with a flight of steps in the middle, or at each end: these plateaux are decorated with statues and vases; the dwarf wall under being broken up by piers, pilasters, or panelled work, sometimes with niches filled with statues, or with basins to receive jets of water: *Illustrations*, s. v. **SCREEN WALL.** On the plateaux when planned on a great scale, are placed basins, having in the centre of them various devices to form fountains. In some places these are simply pipes sending forth jets of water arranged in patterns and rising to various heights. The most noted 'Italian garden' is that of Isola Bella at Florence, *Illustrations*, s. v. **GARDEN:** Chiswick, Chatsworth, and the Crystal Palace, in England, are also esteemed examples. Each plateau is now often laid out in beds cut out of the turf, and arranged in geometrical patterns. "The proper way to plant these beds," says GLENNY, "is to fill all the beds of one shape with the same coloured flower; or when greater variety is wanted, say every alternate bed, that is, if the bed is divided into six, then three will be red and three yellow, or any other colour. The lesser beds should be treated in the same way, and the same colour can only be represented by the same plant. In short, the colours of the uniform beds and the heights can only be similar when the actual variety of the plant is the same all through." The gardens at Cremorne; at Broxbourne; at Sir Bulwer Lytton's, Knebworth, near Stevenage; and at the Horticultural Society, South Kensington; all exhibit such gardens more or less laid out as above described. A garden laid out on such a system, is the reverse of one formed in conjunction with what is called "Landscape gardening".

The earliest notice of Italian gardening is said to be in the work by DE CRESCENTII, *Opus Ruralium Commodorum*, fol., Augsburg, 1471 (or *Trattato della Agricoltura*, 8vo., Milan, 1805). In book viii, treating on gardens of pleasure, he divides them into three classes—each of which ought to be decorated with turf, shrubs, and aromatic flowers. The taste for distributing urns and statues in gardens among the Italians, began about the early part of the sixteenth century, from the accidental circumstance of cardinal D'Este having formed a villa on the site of that of the emperor Hadrian near Rome, where finding a number of antiquities, he distributed them over the newly arranged walks. This method was soon imitated by Francis I. of France, and afterwards in the other European countries. Garden plants in vases began to be introduced about the same time, to decorate pedestals on each side of garden steps. PERCIER and FONTAINE, *Maisons de plaisance de Rome*, fol., Paris, 1809.

ITALIAN PINK. A pigment of a bright yellow colour, extensively used in distemper work and for paper staining, but it is in every respect inferior even to yellow lake; the best kind of Italian pink is, in fact, a yellow lake: FIELD, *Chromatography*, 4to., London, 1835.

ITALIAN POINTED ARCHITECTURE. The course of Pointed architecture in Italy departs so much from the real or supposed rules which elsewhere regulated its stages of transition, and its details differ so much from those in England or in the north of France, that any attempt to give an approximate date derived from the features of the work incurs very great risk of serious error. Besides this difficulty, the researches of Professor WILLIS do not satisfactorily authenticate divisions into schools. In the course of the following remarks, reasons will appear against divisions into only two schools; one being native simplicity, the other extreme decoration brought from Germany. On the other hand, there are great objections to any division that defines loosely the Genoese as being a direct

imitation of Arabian art, the Lombard as being a pursuit of the exuberant variety of French and German Gothic, the Tuscan as being simple in its early stage, and later extremely beautiful in form, and the Venetian (influencing the district between S. Mark's and Brescia) as being characterised by its name. To these must be added the singular Gothic peculiar to the district of the Riviera (*e.g.* the duomo at Ventimiglia): and besides all these varieties, each great monastic Order is said to have developed or used a variety peculiar to itself.

Inasmuch as archæologists are obliged to admit that Pointed architecture was always an exotic in Italy; that few of its productions, except those by foreign artists, are pure enough to deserve continuous study; and that the stamp of classicity (to say nothing of local peculiarities due to Romanesque or Byzantine or Saracenic influences) was always impressed upon native work, it may be concluded that the preceding division into eight or ten schools is useless, even if it be allowed that each great class did develop or use a separate manner. But the division becomes still more unsatisfactory, if it be shewn that each Order proceeded differently according to the district in which it had to build: for then twenty or thirty schools at least are intimated, which with their phases of alteration, form an amount of subdivision not easily to be understood by any one not devoting himself to this special range of investigation. Further research would lead to more subdivision; because, as one of the most judicious of French writers on architecture has said with regard to the broad distinctions in the Pointed art of his own country, "il n'en est pas de même en France qu'en Italie, où la plus petite cité porte une empreinte de construction qui lui est propre; et qu'on reconnoît à tous les pans des murs de ses rues."

Pointed architecture in Italy being so free from trammels, nothing except the abbey at Batalha and Siculo-Norman-Gothic can be more heterogeneous than the church of S. Antonio at Padua dating 1230-1424, one of the most remarkable buildings in Italy, which Niccolò da Pisa was compelled by the fashion of the day to erect in a style which he did not like, and (according to GALLY KNIGHT) did not understand; at least he combined with it some of the Byzantine features of S. Mark's. It has been said that the specimens of Italian Pointed work in Tuscany, especially in Florence, are the best out of the Pisan school: but the church of Sta. Maria della Spina at Pisa, begun 1230 and enlarged 1323, although termed an architectural gem by KNIGHT, is described as so impure by WEBB, *Continental Ecclesiology*, 8vo., Lond., 1848, that he declares it difficult to give the name of Pointed architecture to the style which produced this building, and yet this edifice is more Gothic in appearance than the cathedral, the *campo santo* 1278-85, and the church of Sta. Caterina in the same city. The Certosa near Pavia is considered to be a most magnificent hybrid by STREET, *Brick, etc., Architecture*, 8vo., London, 1855, who pronounces that, excepting the pure pointed form of groining-ribs to the nave, there is scarcely a single detail throughout the church which could ever pass muster as really being of Pointed character.

With this great difficulty of dealing with the question of schools 'in hybrid and mixed styles' in Italy during the middle ages, it will be the most satisfactory course to follow Professor WILLIS through his remarks upon the details which differ from those of English Gothic architecture. "The *pier arches* of the Christian Roman, Pisan, Byzantine, and Italian Gothic styles, are of one order, and either quite plain or decorated with face and edge moldings (architrave moldings occur in SS. Apostoli at Florence, and S. Alessandro at Fiesole). In the churches of Pisa, Siena, and Genoa (except S. Lorenzo), and in the early ones at Florence, as Sta. Trinità, S. Remigio, Sta. Maria Maggiore, Sta. Maria Novella, and Sta. Croce, the arches are plain, as they are in S. Eustorgio and Sta. Maria delle Grazie at Milan, Sta. Sofia at Padua, and Sta. Maria sopra Minerva at Rome. But in the Italian Gothic they have mold-

ings on their edges, and others on their face forming a kind of dripstone, which leaves a parallel surface between itself and the edge, which is commonly flat like the fascia of an architrave, but is sometimes hollowed, as at S. Stefano and the Frari at Venice. The edge moldings are mere chamfers; at the loggia de' Lanzi at Florence, S. Petronio, and S. Giovanni in Monte at Bologna—and in the Venetian district are uniformly edge-beads, as in the cathedral, and Sta. Anastasia at Verona, SS. Giovanni e Paolo, the Frari, and S. Stefano at Venice, in some of which they are carved into ropes."

In the Italian *piers* there is a character of simplicity and squareness that effectually distinguishes them from the late Norman and Early English, in which a greater abundance of small shafts were introduced. One cause of this difference is to be found in the transverse arches of the nave; which in Italy to the last were made of nearly the same breadth and consequence as the pier arches, instead of being reduced to ribs of little more importance than the diagonal ones, as with us. This is most remarkable in the favourite pier of the Italian Gothic; and with slight variations occurs at the cathedrals of Florence and Lucca, and at S. Martino, Bologna; at Or San Michele, and the loggia dei Lanzi at Florence, and the two chapels of the Certosa in the neighbourhood. S. Pantaleone and the Certosa at Pavia, with the cathedral at Verona, are later examples; but the latter has a flat fillet on the front of each half shaft. To use the description by WILLIS himself, "The pier at Milan is different from any other in Italy, and consists of eight nearly equal ogee ribs disposed circularly, five of which serve for the pier arches and side aisle ribs, while three run up to the roof of the nave for the vaulting ribs. The series of niches which surround the pier, form a banded impost; and the whole, although different in details from any other Italian Gothic specimen yet cited, is, as will be seen, the same in principle as them all: indeed, it is worth observing that the characteristic differences between the style of this cathedral, and the Cisalpine (*Northern*) Gothic, which have been so ably seized upon by the author of the *Architectural Notes*, p. xix; but represented as errors, detracting from the merit of the building considered as belonging to the latter style; are in reality the properties of a whole group of buildings, the Italian Gothic; while the faults of Milan are rather derived from the mixture of Gothic decoration; which, while it appears to give it a claim to be admitted amongst Gothic specimens, really injures the effect by its want of harmony with the Italian arrangement."—"S. Lorenzo at Genoa, has an arcade of pointed pier arches on bearing shafts, surmounted by another of circular arches of two orders, resting on piers and bearing shafts alternately; the piers having sub-shafts and edge-shafts. This upper arcade is open to the side aisles, and its apertures correspond to those of the pier arches; the whole looks like the work of French architects, neither the moldings nor the management of the shafts resembling the Italian style."

As to *doorways*, WILLIS remarks on the usual Gothic system of archways consisting of successive orders of shafted ribs applied to a chamfered surface that is concealed in the arch but appears behind the shafts below the impost, "and is either a plain slope, or has projecting moldings and rows of flowers and dog-tooth ornaments, which serve to relieve the shafts and contrast with their plainness. Sometimes a row of smaller shafts are placed behind the principal ones. In the Complete and After-Gothic door-archways the moldings are still arranged in groups, which may be called orders, and are separated by bold and deep hollows, sometimes occupied by piles of shrines or other decorations." In Italian Gothic the "door-archway consists of from two to five or even more orders, and when the wall of the building is not sufficiently thick to admit of the required degree of depth, it is frequently, as with us, assisted by bringing forward the face. The edges of the archways may be all plain, in which case they are commonly provided with nook-shafts, as the west doors of Lucca cathedral; S.

Michele in Borgo at Pisa; S. Michele at Pavia; S. Stefano, S. Matteo, and S. Agostino at Genoa; S. Domenico at Foligno; and S. Nicolò at Spoleto; which have three orders; the west door of the cathedral at Verona, which has five orders of sunk arches; and that of S. Fermo Maggiore, which has eight arches with nook-shafts all continuous. Sometimes the shafts are omitted, and the faces of the orders recede but slightly, like those of an architrave, as at Foligno cathedral, which has five of them, the fourth only having a broad flat shaft."—The edges of the arches are often chamfered or molded;—and these edge-moldings are very often chamfered off, or otherwise got rid of before they reach the base and capital, and then resumed over the arch, in order to simplify the impost, and they may even be confined to the arch, and the pier-edges suffered to remain square. This is not uncommon in English Norman doorways. The edge-moldings may, however, occupy so much of the arch, that its elementary rectangular form disappears; and this is actually the case in some of the later Italian specimens; thus the distinction of orders is lost; but the cases of this kind are few, and principally confined to Venetian examples; for even in the late Italian Gothic doorways of the cathedral at Florence, S. Petronio at Bologna, and S. Tommaso at Verona, the rectangular forms and the nook-shafts are still retained. Sta. Anastasia at Verona, may also be cited as a late example having five distinct, deep, and molded orders without shafts. In the Italian doorways the use of the banded impost (i.e. where the arch and jamb have the same section) is universal: "I know but of four exceptions, the west doors of S. Lorenzo at Genoa, S. Antonio at Padua, the baptistery at Parma, and S. Antonio at Rome."

The *porches* of churches in Italy are confined to the Christian Roman, and Lombard styles, and never occur in the Pisan, Byzantine, or Italian Gothics; but these "naturally led to canopies, of which the earliest specimens have aptly been described as resembling the front of a porch stuck against the wall. But the canopies of the Italian Gothic are constructed on a totally different principle, and resemble those of the complete Gothic. In these the canopy is treated as two inclined lines capable of exerting a diverging pressure that is resisted by the turrets, pilasters, buttresses, or groups and piles of shrines that form flanking piles sometimes standing upon corbels. In the Italian Gothic canopies the crowning moldings, and frequently the drip-stone, return and break horizontally round the flanking pile; whereas, in the Gothic canopies, they always lie against its upright face. However trivial the distinction may appear at first sight, the practice is sufficient to give the very peculiar effect of the Italian examples. The only exception is perhaps a doorway of the nave to the cathedral at Siena. The drip-stone returns horizontally outwards, as in the complete Gothic, at S. Nicolò at Spoleto, and S. Francesco at Terni; but sometimes the drip-stone rests on the impost, sometimes on a corbel, sometimes on a bracket or a capital. The use of molded dressings to square-headed doors, like architraves, under a band which supports a wavy or other canopy, marks Venetian work: but the use of molded dressings to segment-headed doorways, like architraves that return at bottom, is remarkable, for the number and uniformity of the examples, at Naples where they belong, not to churches, but to public or private buildings, and date about 1408 according to WILLIS.

The neighbouring, parallel, and equidistant sides of the compartments of *tracery*, leave between them a space which is a fillet, sometimes carrying a roll of equal breadth, that ramifies and traces the whole of the ornamental figure, and is accompanied in its course by side- or edge-moldings which are the same on both sides of it, so that a transverse section of the whole mullion or tracery bar is everywhere alike, save where a compartment happens to be so small that part of the inferior moldings are lost for want of space. In the late Italian Gothic "the principal compartments are traced out by a fillet, as

already explained; but that done, each compartment is treated as a separate panel and decorated with different moldings, and in a different manner from the rest."—"Amongst Italian tracery may be found both geometric and flowing specimens, but always with upright compartments (one exceptional instance in the *broletto* at Bergamo may be cited): a mixture of round, pointed, and oggee arches is common; but the mixture of round and pointed arches, the dentil borders of the tracery, the breadth of the transom, present characters essentially different from complete Gothic specimens, and are all features peculiar to the Italian Gothic."

"In the north of Italy, where brick and terra-cotta are used, the windows have wide apertures of a single light, and pointed or round arches; their sides, deep and sloping outwards, are decorated with a profusion of moldings in brick, commonly consisting of a succession of alternate hollows and rounds, with fillets between; differing in that respect from the Early English groups of hollows and rounds, which run together without fillets. Sometimes the heads of the windows are foliated, and sometimes a little plain stone tracery is introduced, which in other cases is clumsily built of brick or terra cotta. Drip-stones of the common Gothic section are used, but bordered beneath with dentils, or with a row of small sunk panels upon the space between the drip-stone and window head; such panel strings are occasionally introduced below the window or carried all round it. S. Pantaleone at Pavia, the chapels on the north side of the cathedral at Parma, the south of that at Mantua, and at S. Eustorgio at Milan, the exterior of S. Antonio at Padua, the *Foro de' Mercanti* at Bologna, and the brick apse of S. Fermo Maggiore at Verona, are all good specimens of this kind of molded brickwork."

It may be said that in Venice, as in the north of Italy, the pointed arch was first used in construction; and, some time later and very generally, in a modified form, for decoration also; yet in that city it is rarely used, constructionally, except in churches; and even when employed the oggee arch was, from a very early date, preferred wherever the pure pointed arch was not indispensable.

If there be no discrepancy between their dates and details, the earliest Pointed buildings must be the *broletto* 1215 at Como, where round arches are seen over pointed ones, and the monastic buildings of S. Andrea with the hospital founded 1219-24 at Vercelli, where the exterior of the church is Romanesque brickwork with stone dressings, while the interior is decidedly a specimen of early Pointed architecture. The church of S. Francesco 1228-30 at Assisi has attained the character of being the most perfect example of Pointed architecture in Italy, and of being superior in that respect to the neighbouring church of Sta. Chiara 1253. Much uncertainty exists as to the early dates given to the *broletto* 1152-92 at Monza; the *broletto* of the end of the twelfth century at Brescia; the church of S. Francesco 1225 at Coni or Cuneo; the fair specimen of Pointed art, the church of S. Francesco 1218-65 at Terni; and the yellow brick church of S. Antonio 1231 at Padua, with its attempts at domes by N. Pisano. But in the middle of the thirteenth century were commenced by him or his school, the brick churches of SS. Giovanni e Paolo, of the Madonna del Orto, and of Sta. Maria Gloriosa de' Frari (the finest of its class) at Venice. The church of S. Francesco at Pisa; the imposing example furnished by the cathedral designed 1256 by Lapo, i.e. Jacopo, 1275-90 by Margaritone (not Marchione) at Arezzo; the west front of the church of S. Salvatore 1270 at Pistoia; the churches of S. Domenico 1250-94, and of S. Francesco (apparently called by Professor Willis that of the Servites) 1286-94 at Arezzo; the north transept 1288 and the upper part 1284 of the campanile to the cathedral at Cremona, the churches of S. Domenico 1284-1380, and of S. Francesco 1294 at Pistoia; the church of S. Francesco 1295, and the façade 1284, (finished 1290 by L. Maitani, and considered to be one of the best Gothic buildings in Italy) as

well as portions of the cathedral, and the palazzo del Governo begun 1287, at Siena, belong to the last half of the thirteenth century. The style of domestic architecture of that century is seen in many houses at Bracciano, Corneto, Frascati, Zagarolo, Verona, and Lucca; in the building called La Quarquonia at Pistoia, with two houses of similar date, nearly opposite to it; and in the third cloister of the monastery of Sta. Scolastica at Subiaco. The local peculiarities of several civil edifices, of the twelfth, thirteenth, and fourteenth centuries are indicated in VERDIER and CATTOIS, *Architecture Civile*, 4to., Paris, 1852-7, in examples from Viterbo, Pisa, S. Gimignano, and Siena.

To the end of the thirteenth and early part of the fourteenth century belong part of the church and campanile of Sta. Maria della Pieve at Arezzo; the church 1278 and the cloister 1308-10 of S. Matteo at Genoa; the cathedral 1290-1330 at Orvieto, which is one of the most interesting specimens of Italian Pointed architecture; the church of Sta. Maria sopra Minerva at Rome; the churches of Sta. Maria Novella 1278-1357, and of Sta. Croce 1294-1320 but not consecrated until 1442, with the cathedral 1294-1436, and its campanile 1332, at Florence; the church of S. Ercolano 1297-1335 at Perugia, with that of Sta. Giuliana 1292 outside the city; portions of the church of S. Francesco 1294 at Pistoia; and the (then altered) brick and stone church of S. Fermo Maggiore at Verona. In the first half of the fourteenth century the Italian artists exhibited their ideas of Gothic work in the chapel of Sta. Maria dell' Arena 1303 at Padua; the alterations 1308-20 of the interior of the cathedral at Lucca; the cathedral 1317 at Prato; the churches of S. Martino de' Carmelitani 1313, and of Sta. Cecilia (secularized) 1319 at Bologna; the cathedral 1325-48, and the church of S. Secondo, at Asti; the church of S. Martino 1332 at Pisa, which is a fair example of common Italian Late Pointed work; and the octagonal baptistery called S. Giovanni Rotondo 1337 at Pistoia.

The large number of tombs and monuments of this and the next age, with pointed arches, renders difficult any choice of single specimens among them; those of the Scaligeri at Verona contain a history in themselves.

To the latter half of the fourteenth century may be attributed the marble façade before 1396 to the brick cathedral 1290-1390 with particularly good detail, which is more than usually Gothic, at Monza; the palazzo della comunità 1294-1385, and the palazzo pretorio 1357-77 at Pistoia, which have been highly praised as fine examples of very perfect Italian Pointed work; the churches of Sta. Maria Addolorata de' Servi 1353, and S. Petronio 1390, at Bologna; the cathedral 1315-1415 at Sarzana; and the upper portion or sala del consiglio 1340 to 1369-1423 of the ducal palace at Venice, although another authority considers that the work of this period was the loggia towards the canal and twelve columns on the piazzetta. The Venetian palaces of this and the following century have lately been so efficiently illustrated, that it is here unnecessary to otherwise notice them.

Amongst the structures produced in the fifteenth century may be named, the church of Sta. Maria delle Grazie 1399-1406, about six miles from Mantua; the principal front of the *foro de' mercanti* 1439 at Bologna; the front of the cathedral 1450 at Prato; the equally fine church of Sta. Anastasia at Verona, which has been called the noblest of the distinctively Pointed churches in the north of Italy; that of S. Bernardino 1452 also at Verona; and the cathedral 1467, at Vicenza. The church of S. Agostino at Bergamo; the highly interesting, because perfectly untouched, castle at Bracciano; the façade and cortile of the palace of cardinal Vitelleschi, now the hôtel palazzaccio, at Corneto; the western front of the church of Sta. Maria in Strada, and the church of the Dominicans, at Monza; all belong to the last period of Italian Pointed art. The nave of the church of Sta. Maria delle Grazie at Milan is Pointed, and dated 1465, while the transepts and choir are thirty years later and are Renaissance work. The church of

Sta. Maria Maggiore at Città del Castello, belongs to the fifteenth century, but was finished in the sixteenth. The church of S. Agostino at Ancona is transitional, like that dated 1450 at Montenegro, and that of the Madonna di Monte Luce at Perugia. The last idea of Pointed art, absorbed by the new style, is seen in the Colleone chapel 1475 in the church of Sta. Maria Maggiore at Bergamo, and in the church itself, where the sacristy 1490 offers one of the earliest dated specimens of the modern style. There is scarcely a street in Città della Pieve without instances of Pointed doorways and windows walled up to suit what are commonly, but incorrectly, called Classical notions.

In enumerating the works belonging to this style in the north of Italy the cathedral at Milan has been omitted, in order to use its history as a warning respecting dates, to the student in other cases. It was commenced 1387, the capitals of the great piers were being prepared 1394-5, and the piers themselves were being erected 1401; but so far from the structure being a work of the fourteenth century, it is evident from official documents of the time that the wardens allowed nothing to be executed that was not recommended by the majority of their artists; or, in case of an equal division, by an artist of reputation in some other city. The longest tenure of office by an *ingegnere-generale* was 1490-1522; but even later than this the original plan was altered by the addition of three bays to the front of the nave, which were not vaulted until 1651-9; the new front was decorated with neo-classic doors and windows, and 1790-1806 the wardens determined to keep these portions, but to finish the façade as if originally designed in a Pointed style. Various foreigners were engaged between 1388 and 1483, but they were always quickly dismissed; and their successor G. A. Omodeo (who held longer than any one the office of *ingegnere-generale*) presiding over the work 1490-1522, was confuted by M. Millin with Heinrich von Gmunden, employed 1391-2. In consequence of this error, and of careless consideration of the history of these foreigners, critics have deemed the structure to be *sui generis*, as an example of northern art modifying itself to suit the southern climate under the hands of a German, or at all events of a foreigner rather than of a native; but the facts above stated destroy the imputed credit.

This structure is so famous, and has been so much praised with little reservation until a late depreciation of the too visible effort at verticality on the exterior, that a repetition of such laudations seemed less desirable than an attempt to show how the mediæval wardens, with all their desire for success, ruined their work by want of confidence in a single architect, just as much as those of Florence would fifty years later have spoiled their *duomo*, if Brunellesco had not contrived to ridicule rather than convince his colleagues and rivals. It is indubitably worth while to have shown that no foreigner was so permanently employed that he could have stamped the design as his own; that those foreigners who were engaged always had their work altered, or protested against the native designs; and that the mediæval system of competition so signally failed, that the native architects produced an exterior which has "all the appearance of having been the work of a stranger who was but imperfectly acquainted with the wants or customs of Italian architecture", according to the opinion expressed by STREET.

From various pages of the author last cited, the following list of details respecting Italian Pointed architecture has been collected; viz. the trefoiled arcade used as an ornament for strings, for flat and raking corbel tables, and below sills; the great projection of sills; the marble shafts, with square capitals, instead of mullions; the rows of tufts of drooping foliage (somewhat resembling French and German work) in the capitals; the classical character of the carving; the traceried transoms; the combination of geometrical tracery, as well as of trefoiled ogee arches, with the semicircular arch; the use of a key-stone, frequently slightly decorated, to a pointed arch; the square-

headed panel by which the arch is enclosed; the use of an iron tie instead of a buttress; the rarity of a drip-stone in brickwork; the peculiar crockets and finials of canopies; the masses of wall scarcely, if at all, broken; the buttress reduced to a pilaster; the single gable embracing the nave and aisles of a church; the deep cornice without a parapet; the low relief of tracery and carving; the squareness, with flatness, of moldings; the employment of porches entirely unknown across the Alps; the use of a wooden frame for glass, behind the stone-work of a window; the simplicity of groining; and the great width of pier arches. To these may be added the employment of marble, in panels or in bands or in strings, too thin to permit it to be worked with the depth and richness of molding that are familiar to the student of English and French mediæval art, who, in this respect, might exhibit a cleverness of contrivance in construction that would permit the use of marble with rich moldings. Indeed STREET, besides speaking of the Venetian Gothic moldings as composed of the eternal combination of a three-quarter bead with a shallow hollow, admits that although there are some fine points and a certain dignity and breadth about the general effect of such a church as that of (Sta. Maria Gloriosa or) the Frari (1234), "yet for all those lovely points of detail which in every direction amaze by the art they display and the rich array of beauty with which they clothe the walls of Northern cathedrals, there is at Venice no kind of equivalent in the mediæval churches": and in noticing the ground floor of the broletto at Bergamo, he says "the bases are quite Northern in their section; the caps rather less deep in their cutting, but still in their idea, and in the grouping of tufts of drooping foliage regularly one above the other, reminding one much of French and German work, though certainly not so good as this generally is: there is a flatness about the carving, too, which gives one the impression of a struggle in the hand of the carver, between the Classic and Gothic principles, in which the latter never quite asserted the mastery."

But as a philosophical inquiry into the details of the edifices belonging to Italian Pointed art, the labours of Prof. WILLIS have not been superseded. He does not hesitate to affirm that "Gothic architecture cannot be said to have flourished in Italy at any time", and that in that country "there is in fact no genuine Gothic building." He deplores the undeserved neglect with which what he himself calls Italian Gothic has been treated by tramontane archæologists; urges that the edifices of Italy have a peculiar interest as exhibiting "a continued struggle between two principles, carried on by artists of high ability"; and notes that "the curious result is a style which exhibits pointed arches, pinnacles, buttresses, tracery, and clustered columns, rib-vaulting and lofty towers." He adds that "it is worth examining, therefore, how it happens that these characteristics may be freely and exclusively used in a totally different style"; he also uses the term *Early Italian* "to express a large class of churches erected in that country and in the early period, but the style of which, like the early German, is not very definite"; and likewise considers that "in Italy the Gothic was at once superseded by the revived classical", i. e. that there was no *After-Gothic*, as he terms Flamboyant and Perpendicular. One more of his opinions requires attention: "it is curious enough that in the Neapolitan territory, in Naples especially, many specimens or rather fragments of good Gothic buildings are to be found which were erected under the Angevine dynasty, beginning in 1266, with Charles, son of Louis VIII, king of France, and ending in 1435: with this exception, I do not believe that a single unmixt Gothic church is to be found in Italy." In this praise may perhaps be included two or three palazzi at Naples; the campanili at Amalfi and Velletri; the castles at Andria, Castellamare, and Teano; some houses of the fourteenth and fifteenth centuries at Aquila, Popoli, and Solmone, with the aqueduct at the latter place; and at Galatina the monastery of Sta. Caterina, of the fourteenth century, but having lancet windows. But the

cathedral at Trani must be regarded as falling under the ban with which the structures termed "Gothic" in Sicily are regarded by the purists in archæology, who accept, as specimens of imitative Gothic art in North Italy, edifices which they are obliged to describe as impure, heterogeneous, and impressed with the stamp of Classical, Byzantine, Saracenic, and Romanesque influences. SICILIAN ARCHITECTURE.

The last indication of a feeling for Pointed art by Italians seems to have been manifested about 1635, in some of the designs for the completion of the cathedral at Milan. SCHULZ, *Denkmale der Kunst Unter-Italien*; WILLIS, *Remarks on the Architecture of the Middle Ages, especially of Italy*, 8vo., Cambridge, 1835; GALLY KNIGHT, *Ecclesiastical Architecture of Italy*, fol., London, 1842-4; *Illustrations*, s. v. Apse; Brick-work; Cornice; Campanile; Tomb; and Window.

ITALIAN ROOF. This term appears to have been given in the last century to a roof hipped every way, in contradistinction to the old gabled roof; HIP. "We prefer, on many accounts," writes GWILT, *Encyc. (Specifications)*, p. 603, "and, indeed, ourselves usually adopt, the Italian method of laying the rafters horizontally as so many purlines. For the boarding ($\frac{3}{4}$ to 1 in. thick) thus (*sic*. query not) lying lengthwise towards the gable (or hips), any wet that may find its way on to it, from defective slates or lead, is not apt to lodge against and rot the edges." Many architects extend the system by making the purlines of an additional thickness, and laying boarding of 1 in., 1 $\frac{1}{4}$ in., or 1 $\frac{1}{2}$ in. in thickness, diagonally across them; thus doing away with the rafters altogether.

ITALIAN STYLE OF ARCHITECTURE. This term expresses the general character of design in Italy, which after Romanesque art had passed through the transitional stage practised by the *trecentisti*, was developed into the *risorgimento* by the *quattrocentisti*, next became the pure style (*stile cinquecento*) of the sixteenth century, and after a period of decadence culminating in the *bizarre*, the *barocco*, and the *rococo*, at the end of the seventeenth, was reformed at the beginning of the eighteenth, and appeared as the true neo-classic style which apparently was the aim of such men as Alberti and Palladio.

Although most of the Italian cities, especially Bologna, Brescia, Genoa, Milan, Naples, Turin, Verona, and Vicenza, possess buildings in this style characterized by peculiarities more or less striking, architectural critics have hitherto recognized only three schools (or rather classes), those of Florence, Rome, and Venice.

THE FLORENTINE SCHOOL.

If the restoration of antique art had been attempted by any architects in Italy before 1400, their influence was not sufficient to direct a national taste. This success was reserved for Brunellesco, who founded about 1420 the Florentine school, with B. da Majano, Michelozzo, Alberti, and Pollaiuolo; followed by B. (Baglioni) d'Agnolo, Raffaello Sanzio, Ammanato, and Buontalenti as principals, with many pupils less distinguished; but the two last are sometimes excluded from the list, so that it may end about 1550. The Florentine school of design is distinguished by a plain mass of building pierced with windows but not rendered insecure as a fortress by any projections: the palazzo Pitti by Brunellesco is an example. Adopting in his church of S. Andrea at Mantua the antique arches of triumph, Alberti was the first of the revivalists to forsake the practice of the decadence of the fifth and sixth centuries, which then prevailed at Rome, and no longer to employ arcades upon columns. His alterations to the church of S. Francesco at Rimini also shows an adaptation of arcades in a method that was afterwards generally adopted. His palazzo Rucellai 1460 exhibits the second phase of the Italian style, viz. the introduction of pilasters suited in height to the story to which they were affixed; a feature which had been anticipated 1430 in the upper story of the cortile of the palazzo (Medici afterwards) Riccardi at Florence by Michelozzo.

A branch of this school was based on a hint given by Alberti as to the propriety of an order being equal in height to the edifice it has to adorn: and the palazzo del Tè at Mantua by G. (Pippi) Romano gave great impulse to the progress of this idea, which in the hands of the Roman Buonarroti, and the Venetian Palladio, constituted a chief feature of their most important edifices.

If the column and the entablature were found too expensive or injudicious, a cornice to crown the edifice of the same proportions as if they had been introduced, was applied in many cases with good effect, as in the palazzo Massimi at Rome, where it is about $\frac{1}{10}$ of the total height of the edifice: at Florence the palazzo Pitti is deficient in point of dignity from the absence of the grand cornice; such absence does not occur in other examples of some of these palaces and villas, a list of which showing the height as proportioned to that of the building, is given *s. v.* CROWN CORNICE. The palazzo Medici, built with an evident resemblance to the palazzo Pitti but on a smaller scale, is rendered much more imposing by its grand unbroken cornice having very nearly one-eighth of the height of the whole façade. This building exhibits the Romanesque feature adopted from Byzantine art, of semicircular-headed apertures, for windows grouped in pairs by the intervention of a column under one arch, all springing from the same level, and the spandril being filled with a patera; many palazzi were so ornamented until 1454: among them, the Strozzi by B. da Majano, which is surmounted by a cornice the sole part of the structure that can be attributed to S. Pollaiuolo, but which is considered not only to be his masterpiece, but the most beautiful production of external architectural decoration that has yet been designed, a preeminence which it shares with that added by Buonarroti to the palazzo Farnese by San Gallo. In the palazzo Pandolfini by Raffaello, the proportions of the cornice and frieze are almost identical with that of the preceding example. The palazzo Farnese at Rome is also in the Florentine style, and its cornice almost reaches the same proportions. In the two lower orders of the cortile the architect is deemed to have effected the most exquisite imitation in modern times of the antique alliance of columns with the piers of arches, a system introduced by Sansovino into the Venetian school.

Among the *Illustrations* given, examples of this style will be seen in the plates, *s. v.* Apse; Arcade; Campanile; Cancellum; Cinque Cento; Corbel; Cortile; Church (interior); Façade; Gateway; Genoa; Loggia (Basilica); Metal-work; and Pulpit.

THE ROMAN SCHOOL.

As LETAROUILLY, *Rome Moderne*, fol., Paris, 1840, has bestowed more attention than any other architect upon the progress of modern art in Rome, the following sketch of the rise and progress of this school is abridged from his work 39-44. The Florentine school dominated for half a century at Rome, as may be seen in the structures which present the steady and solid character of those at Florence; such as the palazzo di Vinegia 1468 by G. da Majano. The continuation 1475, probably by B. Pintelli, of that building is distinguished by less height with more regularity and elegance, but the aspect of a fortress still remains: the style of Pintelli resembled that of Brunellesco, but his details possess extreme delicacy and infinite grace, which Bramante imitated but only approached. At the same period Alberti, the papal architect, was exhibiting his pure taste and elevated style, which have great analogy with the taste and style of Pintelli but avoid his dryness. In a lesser degree G. da Sangallo, belonging to the same school, had the same good qualities and the same imperfections. To him succeeded Bramante, whose works, such as the palazzo della Cancelleria, and the palazzo Giraud, with the church of S. Pietro in Montorio, deserve as much admiration for grace and refinement of detail as for elevation of style and conception.

These two last are excluded from the Florentine school by GWILT, *Encyc.*, who replaces them by Raffaello Sanzio, the painter, and nephew of Bramante.

The succeeding artists, although many of them Florentines, belong to the Roman school. Architecture, in the hands of A. da Sangallo and of B. Peruzzi, underwent a positive change; it lost the lingering traces of dryness, and attained the summit of perfection, for it joined a just appreciation of the relation of proportions and great purity of detail to elegant forms and grand (or rather majestic) masses: as examples the palazzi Farnese, Palma, and Sacchetti by Sangallo, with the two palazzi Massimi may be cited.

If architecture was steadily reaching perfection from 1400 to 1550, progress ceased in the middle of the sixteenth century. Art, although still preserving a lofty appearance, had begun to exhibit a waning taste. Its freshness, youthful vigour, and distinctive character were gone; elegance of form and elevation of style had perceptibly diminished; and architecture no longer knew the *style de la renaissance*. That epoch certainly possessed some men of great genius, such as Buonarroti, Barozzi da Vignola, A. Palladio, Pirro Ligorio, and G. della Porta. But Buonarroti, fully seventy years old when he was earliest concerned with designing buildings, was the first to introduce innovations, which under his dictatorship set architecture on the road to destruction. The tasteful and rational Vignola might have counterbalanced that influence, but his chaste and elegant conceptions of the true Renaissance at CAPRAROLA was unfortunately displayed nearly sixty miles from Rome, where his works were very few. That city possesses scarcely any edifice designed by Palladio, who carried to Venice and Vicenza the fruits of the knowledge gathered at Rome by his analytical and synthetical powers. The buildings erected by Ammanato have nobility of character, the masses are imposing, and the divisions have grandeur, but the details are as often incorrect as pure. The villa Pia in the gardens of the Vatican, testifies to the archaeological studies of Ligorio. Finally the bold conceptions, as at the collegio della Sapienza, and judicious arrangements invented by the imagination and facility which G. della Porta enjoyed, cause a deep regret that he should have forgotten that Vignola was his master, and should have allowed himself to be seduced by the fashions of the day. The palazzo Borghese by M. Lunghi belongs to the second epoch, just described, which lasted about half a century and expired with the sixteenth century: it was a period of transition, and gave rise to a style of architecture that had at first no character and no significance, but which soon developed its bizarre and extravagant nature. This third epoch was a new decadence, in which clever men like D. Fontana, P. Beretini da Cortona, Bernini, Borromini, and last of all Fuga, exhibit mannerism as the result of lively and powerful imagination; and prove that a bad genius, the spirit of the time, had reduced them to a servitude in which disorder and anarchy were impudently proclaimed as alone worthy of distinction.

The architects of the Roman school succeeded, on almost all occasions, in impressing upon their designs a character of grace and lightness without loss of dignity: and consequently the style of Vignola has been, and will probably continue to be, the favourite one in France. Works of the most opposite nature of design, some like the palazzo della Cancelleria or the palazzo Farnesina by Peruzzi (consisting of a basement with two orders above it), some like the palazzo Massimi by the last named master, with a single order (on the ground floor) attached to a rusticated front, are nevertheless the offspring of a similar feeling exhibiting the greatest purity of style, chasteness of composition, and harmony throughout the details, even, in some instances, extending to their common want of vigour.

Among the *Illustrations* given, examples of this style will be seen in the plates, *s. v.* Angle; Arcade; Arch; Belvedere; Ceiling; Chapel; Confession; Cornice; Cortile; Doorway; Fountain; Loggia; Pedestal; Piazza; and Screen Wall.

ARCH. PUB. SOC.

THE VENETIAN SCHOOL.

The modern style was not so cordially received in Venice as in Rome; and the architects resisted as long as possible the new system. Classic details were scarcely ever adopted before 1480-5; and the buildings were erected in a transitional style until about 1530; such as the palazzi Trevisano, Vendramini, smaller Cornaro, and Camerlinghi, but the most striking edifices in Venice of the new character date 1530-80; such as the palazzi Grimani, and the greater Cornaro.

The great names attached to the Veronese or Vicentine school are those of the founder, San Michele, who almost confined himself to the style of one order and a rusticated basement, as at the palazzo Pompei at Verona; of Jacopo (Tatti) Sansovino, who equally attached himself to the system of arcades with orders in tiers, as at the Procuratie at Venice; and of Palladio, who, adding the Roman practice of presenting the appearance of two stories in the height of one order to the above mentioned systems, combined the beauties of all the Italian schools, a style in which he was followed by Scamozzi, Da Ponte, and Vittoria. After this period 1530-80 date the works of Longhena, Benoni, Temanza, etc., in the palazzi Pisano, Rezzonico, and Pesaro.

Among the *Illustrations* given, examples of this style will be seen in the plates, *s. v.* Apse; Canopy; Cloister; Doorway; Façade; Staircase; and Tomb.

The three schools produced scholars who set about ascertaining what was the antique method, and what therein was beautiful. After such study, it is not surprising that some of them should dare to believe that the remains called antique were imperfect in many respects, and should give to the world their corrections in publications, which became the text-books for architects in other countries who could not prosecute similar investigations.

According to some critics, the architects of the fourteenth and fifteenth centuries ought to have considered the remains of Roman antiquity as models to be freely followed in spirit, but modified according to circumstances; and they hold that these architects, if they erred in nothing else, were wrong in endeavouring to establish a standard for each order, rendering them so many formulas to be applied without change on any occasion, at any height, in any situation, and for any building. But these critics overlook the fact that the revivalists had little or no guide, to point out which was the most beautiful or the worst of the remains of antiquity, except their own eyes, which they might very fairly distrust. Each great architect had a right to suspect that those remains he had the good fortune to be able to study, were of an inæsthetic age unless somewhat conformable to the standard furnished by the text of VITRUVIUS, and to publish his own view of that which seemed to him to be perfection. The fault of making formulas out of their illustrations rests with the architect-builders, who would not study antiquity when placed under their eyes by such publications, but took a false glory in being the pupils as they called themselves, but in reality the ignorant imitators, of Vignola and Palladio.

The parallels by CHAMBRAI, NORMAND, and MAUCH, show wherein these masters and their commentators differed; it is therefore sufficient to add that to them is to be ascribed the extensive introduction in design of 1, a system of proportion of apertures; 2, the use of pedestals; 3, varieties of dressings to apertures, etc.; 4, the use of rusticated work; 5, the constant introduction of sculpture as mere decoration; 6, the aræo-systyle intercolumniation (this is Blondel's); 7, the use of balustrades; 8, extension of variety of plan; 9, the apertures for the emission of smoke; 10, grand staircases in interior decoration; 11, the basement story as a feature; 12, the attic story as a feature; 13, the chimneypiece as a matter of architecture; 14, spires, steeples, and bell-towers; 15, fountains;

and 16, the care taken first by Palladio to exhibit breaks in the roof corresponding to those in the façades.

The practice of piling the five orders one upon another, as at Campden in Gloucestershire; the schools at Oxford; the château d'Anet by De Lorme; and the church of Sta. Chiara at Naples; seems to have been suggested by the Colosseum, but in buildings on a limited scale it becomes simply ridiculous.

Besides GWILT and LETAROUILLY, already mentioned, other authors to be consulted are those who have published works on the cities herein named: also GWILT, *Notitia Architectonica Italiana*, 8vo., London, 1818; DONALDSON, *Collection of Doorways from Modern Buildings*, 4to., Lond., 1836; and GRUNER, *Fresco Decorations and Stuccoes of Italy during XVth and XVIIth Centuries*, 4to. and fol., London, 1844.

The Italian style (not the Renaissance, which was earlier) was introduced into different countries at different periods: it was received by Spain about 1460; by France about 1495; by Germany about 1553; and by England about 1619.

Transitional work is observable in *Spain* in the palace 1461 of Diego Hurtado de Mendoza, duque del Infantado, at Guadalajara (the Doric columns upon the ground floor of the two-storied patio seem to have been inserted 1570); the greater part of the cathedral commenced 1471 at Astorga, in the very latest kind of Gothic: the Dominican college of S. Gregorio 1488-96 at Valladolid by M. Carpintero; the two courts 1504 of the hospital-general at Santiago; and the hospital de expositos 1504-14 at Toledo by H. de Egas: the octagonal *cimborio* 1505-20 of the cathedral at Zaragoza: the cathedral commenced 1513 at Salamanca by J. Gil de Hontañón; and the *colegio mayor* de Santiago el Zebédo or del Arzobispo 1521 at Salamanca and its chapel by P. de Ibarra, which are Gothic with details varying in character upon its cloister by Ibarra, which is entirely Renaissance. The new style is seen firmly established in the palace 1527 of the Alhambra at Granada by P. de Machuca; the cathedral 1529 at Granada by D. de Siloe; the *capilla* de los reyes nuevos 1531 at Toledo by A. de Covarrubias; and the hospital of S. Juan Bautista 1542 by Bustamante. It is worth while to notice the remarkable practice of D. de Rianno, architect to the cathedral at Seville, who 1530 designed the Gothic *sacristia* de los calices; the plateresque or Renaissance *sacristia mayor*, and the modern Italian chapter-house.

From the first quarter of the sixteenth century, the Spanish architects with a few provincial exceptions, accepted as canons of taste the illustrations in SAGREDO, *Medidas del Romano*, 4to., Toledo, 1526, p. 33 (translated into French, 4to., cir. 1563 as *Dialogue de l'arch.*); but the *arquitectura Greco-Romana* as it was called, is considered not to have arrived at its perfection until the design made 1563 for the Escorial by J. B. de Toledo, or rather until that work fell 1567 into the hands of his pupil J. de Herrera. That artist's domination over the other architects of his country until 1597, and the example set till 1610 by his pupil F. de Mora, and till 1647 by his pupil J. Gomez de Mora, may be said to have prevented for a long period the decay of the style. But immediately after, the Italian style of the time as practised by Borromini was caricatured by such Spanish architects as the *chafallon* Ribera, the *geroniceista* Churriguera, Tomé, Barbás, and other *badulaques*, nor much improved after 1730 by the employment of Galucci, Juvara, Sacchetti, Ravaglio, Frascina, Sermini, Bonavia, and other Italians employed by the partiality of queen Isabella, wife of Philip V. The classic period begins with Ventura Rodriguez, F. Sabatini, J. Soler y Faneca, with F. Sanches, A. Sanz, R. Duran, M.M. Rodriguez, S. Perez, the five pupils of V. Rodriguez, and J. de Villanueva. The later architects, from the commencement of the present century, had so little employment that there is nothing to be said of the recent Spanish use of the Italian style by any but living artists.

In *France* the real style *de la Renaissance*, which dates at least from the introduction 1495 of a colony of Italian artists by Charles VIII, was for a long time in a state of transition

that has given rise to the terms style *Louis XII* (1498-1515), and style *François I* (1515-47). The employment of Vignola and Serlio by the last named monarch, renders it easy to infer that the reign of Henry II (1547-59) completed the adoption of the Italian style as it was used in the time of Francis II (1559); Charles IX (1560-74); Henry III (1574-89); and Henry IV (1589-1610). The great work by ANDROUET DU CERCEAU, *Les plus excellents bastiments de France*, fol., Paris, 1576-79, exhibits Blois, Amboise, Fontainebleau, Chenonceaux, Madrid, Gaillon, Vallery, Verneuil, Charleville, Ecouen, with the Louvre and the Tuileries. In ecclesiastical architecture, the period of transition lasted throughout the sixteenth century; but during the reign of Louis XIII (1610-43) Italian architecture in France passed through a stage represented by the church of S. Paul and S. Louis 1627-41; by the church of the Sorbonne, designed 1629 by Lemercier; and by the church of the Val-de-Grace 1645 by Le Muet; and it thus became so thoroughly national in its character as to be better styled French neo-classic art. This is represented by the porte S. Denis 1672 by Blondel; the porte S. Martin 1674 by Bullant; the palace at Versailles by J. H. Mansart; and the portion of the Louvre due to Perrault. This was the true style Louis XIV; it died out before 1725 and was superseded by the *debile* typified by the Louis XV decoration, which occurred during great part of the reign of Louis XV (1715-75). In despite of the praises usually accorded to the front by Servandoni for the church of S. Sulpice, the usual classic style can hardly be said to have been exhibited, on a large scale, earlier than the church of Ste. Geneviève 1755 by Soufflot. Its influence is seen in the hôtel des Monnoies 1768 by Antoine; in the church of the Madeleine 1804 by Vignon; the arc de l'Etoile 1810 by Chalgrin; the palais du corps législatif 1807 by Poyet; and the bourse 1808 by A. T. Brongniart. But by a certain revulsion of feeling the most recent works in France that are not Gothic are in some form of the Italian style. FRENCH ARCHITECTURE.

In *England*, except a part of Wilton house, Wiltshire, 1540-53, attributed to H. Holbein, nothing so much resembling the Italian style as Longleat 1567-79, supposed to be by Giovanni da Padua, is to be found for many subsequent years. A note by DALLAWAY, *Anecdotes*, 8vo., London, 1800, p. 62, records that "the first house purely Italian erected in this kingdom, was by Sir H. Palavicini at Little Shelford, Essex." Although details had been procured by SHUTE, *The Chief Grounds*, etc., fol., London, 1563, yet even so late as 1613-9 the gateway of the school at Oxford is impure and grotesque, like Wollaton, commenced 1580-8, and all the other celebrated Elizabethan and Jacobean mansions: and it is not until 1619 that the partisans of the Italian style are entitled to commence the history of modern English architecture, which, for about two centuries, professed more or less to follow the examples left by Palladio, whose school exhibited three systems, sometimes more or less mixed in this country. The recollection of Whitehall as intended, and of the façade of the chapel at old Somerset house, with the reputation equal to that of Vignola for exactness and purity, does honour to Inigo Jones, whose portico to old S. Paul's cathedral was a perfect neo-classic design. The cathedral of S. Paul by Wren exhibits in the chief portico the arcostyle disposition, giving a license which he did not contemplate to that arrangement. The designs for Blenheim, Castle Howard, and Grimsthorpe, by Vanbrugh, are in a manner which no Italian architect of the time could have approached. The church of S. Mary Woolnoth is due to Hawksmoor; and Wanstead house testified to Campbell's genius. Magnificent residences like Holkham by Kent; Harewood house by Carr; and Kedleston hall by Adam, sprang from this example. Less grand, but greatly exceeding in beauty, are the works of Gibbs, Taylor, and Chambers. The classic school succeeded as in other countries; if Dance cannot fairly be said to have inaugurated it, the merit must rest with

Soane, Holland, Inwood, Wilkins, Hamilton, Basevi, Elmes, and Sir Robert Smirke. The revival of the Italian style is to be seen in almost every club-house, bank, and insurance office erected since 1830; and, not to speak of living architects, the names of Sir C. Barry and of C. R. Cockerell may be cited as the leaders in the adaptation of cinque-cento art to modern purposes.

The transition from Pointed to modern art in Germany was more sudden than in any other country, a fact probably due to the large employment of Italian architects. Although Aristotele Alberti had been employed 1455-85 in Hungary and Russia, the modern Italian style was perhaps first introduced into Germany 1553 at Innsbruck. Certainly after 1571 the country was in the hands of architects who showed little favour to a Pointed style. The porch 1571 of the *rathhaus* at Cologne has pointed arches in a classic colonnaded arcade; the old palace at Munich was designed 1575-1616 by P. Witte, a pupil of Vasari; and similar tuition is visible 1574-8 at Rothenburg; 1583-97 in the church of S. Michael at Munich by Müller; 1600 at Nuremberg; 1556 and 1607 at Heidelberg: the cathedral 1614 at Salzburg by Solari; with that at Munich; and many more churches were intended to be more or less imitations of S. Peter's. At the commencement of the eighteenth century the school of Borromini presents itself; the Zwirner palace 1711 at Dresden; the church of S. Carlo Borromeo 1716 at Vienna, like all the other productions of Fischer von Erlach; the Liebfrauenkirche 1726-45 at Dresden by Behr; the hof-kirche 1736 in the same city by Claveri; and the cathedral 1750 at Berlin by Boumann are examples. The classic period was inaugurated by the Brandenburg Thor 1781-92 at Berlin; Gärtner, Klenze, and Schinkel, its devotees, seem to have exhausted the opportunities that might have allowed the revival of the Italian style, and to have left successors who endeavour to retrace the path of art in Germany from the Romanesque downward.

ITALICA (ancient *Sanctis*), now called *Sevilla la Vieja* or Old Seville, is situate near the village of Santiponce, about four miles northwest of Seville in Spain. It was founded by Scipio Africanus for his wounded soldiers, B.C. 207. It became a bishopric under the Goths. The present ruins show marks of having been reduced to their present state by an earthquake, though the town is assumed to have been destroyed when the Arabs evacuated it for Seville. An amphitheatre, now only of rubble with brick arches, having been deprived of its stone casing in 1774 for repairing roads, is about 325 ft. long and 180 ft. wide in the arena, with twenty rows of seats half of which are buried; each seat is 2 ft. 6 ins. wide and 2 ft. high; the steps being 12 ins. high and wide; part of the podium remains, and also enough of the entrance to show it consisted of three large arches. Some small excavations at the end of the last century brought to light a temple, with several statues and capitals of columns, the best of which were taken to Madrid, the remainder to Seville. Traces exist of the vaulted brick reservoirs of the *AQUEDUCT* constructed by Hadrian commencing at Tejada, seven leagues distant. Five or six tessellated pavements, one with Trajan's name, were also found, and two were walled in; one discovered 12 Dec. 1799 and since destroyed, was published by LABORDE, *Descr. d'un pavé—découvert dans l'ancienne ville d'Italica; recherches sur la peinture en mosaïque*, etc., fol., Paris, 1802, and 1806. Two views of the amphitheatre are given in TAYLOR, *Voyage en Espagne*, 4to., Paris, 1826-43, i; WELLS, *Spain*, 8vo., London, 1836, p. 392; SWINBURNE, *Spain*, 4to., London, 1779-87, p. 251. NONNIUS, *Hispania*, 8vo., Antwerp, 1607, p. 64-7. CONDÉ, *Arabs in Spain*, 8vo., London, 1854, i, 144, calls it "Silvia-Italica, the ancient seat of the Eparcos of Spain." In the village of Santiponce is the castellated but ruined Hieronymite convent of S. Isidoro, founded 1301 by don Alonzo Perez de Guzman, which contains the tomb of himself and his wife, the founders of the ducal house of Medina Sidonia; the figures date from 1609.

28. 59.

ARCH. PUB. SOC.

ITALICK ARCHITECTURE. A term used in the eighteenth century for the Composite order.

ITASSE or YTASSE (. . .) appears in KRAFFT, *Plans, etc., Maisons*, etc., fol., Paris, n. d., pl. 8, as having designed 1789 the maison Thamney (or Tamney as in the text), rue de Provence, at Paris, consisting of four separate houses; and pl. 94, gives the decorations of the saloon 1801, when it belonged to M. Bainting.

ITICA-CULLU. An indurated clay used in lieu of brick, in India. *LATERITE*.

ITINERARY PILLAR. A pillar placed where several roads meet, and having inscriptions on its different faces directing the traveller to the points to which the roads severally lead. The most celebrated of these was the Aureum Milliarium at Rome. The distances, however, were not measured from this pillar, but from the various gates.

ITTAR (SEBASTIANO), architetto comunale e delle R. antichità e della R. università degli studi di Catania, and, 20 June 1836, hon. and cor. member of the Institute of British Architects. Whilst at Rome, he and Balaestra were engaged by W. R. Hamilton for the service of Lord Elgin, and were principally employed in making drawings for him at Athens from August 1800 to April 1801 (Society for the Diffusion of Useful Knowledge, *Elgin Marbles*, 8vo., London, 1833, i, 2). In 1831 he submitted to the Société libre des Beaux Arts of Paris, his drawings of the monuments on the acropolis at Athens, as reported in COTTA, *Kunstblatt*, 1831, p. 401. In 1837 the following paper by him was read at the Institute, *Rapporto sugli ultimi scavi fatti del teatro di Catania*, which remains in manuscript. He died before 29 November 1852.

68. 116.

ITURRIZA (PASCUAL), born at Motrico in Spain, made 5 May 1541 a design for the *capilla mayor* of the parish church at Placencia in Guipuzcoa, which was adopted in preference to one that had been procured 1532 from M. de Igarza. A fault was found with the minute work in the upper part, which could hardly be seen from below, he appealed to the decision of any 'peritos en la gimetría' that his critics would bring to the building; and the referees confirmed his opinion. He succeeded 1559 to Estiburu at the works of the church of Sta. Marina de Oxirondo in Vergara; and died in 1563; the works were finished by J. de Amasajabel. J. de Alzua was his pupil, and the contract (or indenture of apprenticeship) is a very early proof of the existence of that relation between master and pupil.

66.

IVARA (FILIPPO), see JUVARA (F.).

IVARRA (PETRUS DE), see IBARRA (PEDRO DE).

IVIZA, IVICA, or IBIZA (ancient Ebusus). The capital of the island of the same name, in the Mediterranean, near the coast of Spain. It was fortified 1556 by Antonio Jayme, after the design of his master J. B. Calvi, and is entered by two gates. The streets are very steep, the town being situate on a height. There are two churches, one being a cathedral dedicated to Sta. Maria Maggiore, and designed between 1785 and 1796 by Josef Garcia; two hospitals; a theatre; an almshouse; a prison; an arsenal defended by a fort; and a good harbour.

IVORY. The tusks of elephants, walrus, and of some other animals, and often superseded by the best kinds of the bones of animals. The decay of articles in ivory can be checked, even when its progress has advanced so far as to cause the specimens to crumble away under the hands. Some specimens from Nineveh were found in a state of great decomposition. Professor Owen suggested that as the decay was owing to the loss of gelatine in the ivory, the articles should be boiled in a solution of gelatine; on this being done they became firm and solid. Works by the Mediæval and Renaissance carvers in ivory will be found detailed in WYATT, *Notices of Sculpture in Ivory, a lecture*, etc., 4to., London, 1856; and OLDFIELD, *Catalogue of select examples of Ivory Carvings from the IInd to XVth Century*, 4to., Lond., 1856; both for the Arundel Society. *Art Treasures Exhibition*, in *BUILDING NEWS Journal*, iii, 1857.

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Veneers of ivory are cut in a ratio of thirty to an inch in thickness; and as the sawdust, together with the scraping from after processes, effect a waste of one-half, it often happens that sixty finished ivory veneers will be no more than an inch in aggregate thickness. M. Pape of Paris devised a mode after that of the Russians, of cutting veneers out of solid blocks by slicing it spirally from the surface towards the centre, like unfolding a cloth. He produced sheets measuring 150 ins. by 30 ins. Ivory forms a fine and delicate material for graduated scales in mathematical instruments; but it is liable to expand and contract, under alternations of weather, so that the Tithe Commissioners have refused to permit the use of ivory scales in mapping. Mr. Cheverton in 1850 patented a mode of making "artificial ivory"; *ENGLISH ENCYCLOPÆDIA*.

The specific gravity of ivory is put at 1·917; and it weighs about 120 lbs. per foot cube. When acted upon by salt water, it soon decomposes and becomes brittle. The cohesive strength of ivory is 16,280 cwt.; while bone is 5,250; horn 8,750; whalebone 7,500; and the tooth of sea-calf 4,075. Two-thirds of these weights will sensibly impair the strength after a considerable time, and one-half is the utmost that can remain, without risk, for ever; *BUCHANAN, Millwork*, 8vo., London, 1841, 252. The stony seeds of the *ATTALEA* supply a kind of vegetable ivory.

IVORY (THOMAS) designed about 1754 the assembly house at Norwich, now used as a masonic hall; the exterior is plain, but the interior is well decorated with paneling and festoons, and enriched ceilings, in stucco: 1754-6 the octagon chapel in Colegate-street, surmounted by a dome supported by eight Corinthian fluted columns; and 1757 the theatre, of which he was also the proprietor; this was built in imitation of the one of that period in Drury-lane, London. His will dated 2 July 1775 was proved 23 March 1780, the year, it may be presumed, of his death. His son William erected a pew 1780 in S. Helen's church, Norwich.

IVORY (THOMAS) is said to have been self-educated. His only recorded work is 16 June 1773-7 the king's hospital, better known as the Blue Coat hospital, Dublin, for 300 boys; the façade consists of a centre with two wings extending 300 ft. Up to about 1805 it appears to have cost £21,294. The original drawings by Ivory existed for many years in the board room. A volume of well drawn plans, elevations, etc., dated 1776 and signed with his name, are also in the king's collection, British Museum: that and the following building are shown in *MALTON, Dublin*, fol., 1792. The Hibernian marine schools, sometimes attributed to Ivory, were probably by T. Cooley. He held for some years the office of master of the architectural school of the Royal Dublin Society. A fine engraving by E. Rooker before 1780 of "the cassine at Marino" designed by Sir W. Chambers, was from a drawing by Ivory. He died in Dublin in 1786. *WARBURTON* and others, *Dublin*, 4to., London, 1818, i, pp. 567, 1187.

IVORY BLACK, and BONE BLACK. Bones are heated in iron cylinders to dissipate the more volatile products of the animal matter they contain, and to leave the phosphate of lime intermixed with much charcoal and some of the saline portions of the bone. This black possesses the singular property of completely destroying the colour of a great number of animal and vegetable solutions to much greater extent than common charcoal: the finer the powder the greater is its efficacy, in which state the charcoal combines with the colouring matter. This power of decolorising has not been explained. When well prepared, this black is used in water and in oil painting. Ivory black or elephanthinum is said by *PLINY, N. H.*, xxxv, 25, to have been invented by Apelles.

IVORY BROWN and BONE BROWN. These colours are produced by roasting bone and ivory until by partially charring they become of a brown colour. The palest are almost the most opaque; the deepest are more durable, and most so when they approach black. They are bad driers in oil, and their

lighter shades are not durable either in oil or water when exposed to the action of strong light, or mixed in tint with white lead. *FIELD, Chromatography*, 4to., London, 1835.

IVREA. A town situated northeast of Turin, on the river Dora Baltea, in the Sardinian states. It is walled and fortified; the machicolations remain of two of the towers of the old castle. Of the two suburbs, one on the opposite bank of the river is crossed by a bridge of one arch, constructed about 600 by the Lombard king Agilulfus. The town is irregularly and poorly built. The cathedral, dedicated to the Assumption of the Virgin Mary, is in a Gothic style, is supposed to occupy the site of a temple to Apollo, and to have been founded about the middle of the fifth century. There are also five churches, several of them of great interest for their antiquity; a town house; a court house; a bishop's palace; the palace of Perrone; an episcopal seminary, with a good library; a provincial college well situated in a large garden; public schools; a theatre; public baths; and a civic hospital. 50.

IVRY (CONTANT D'), see *CONTANT (PIERRE)*.

IVY. The English name of *Hedera helix*, the common ivy; *Glechoma hederacea* or *Nepeta glechoma*, being the ground ivy. The common ivy, in its infant state, has stalks trailing on the ground and protruding rootless throughout their whole extent; its leaves are spear shaped, and it bears neither flower nor fruit: this is the "ivy creeping on the ground." When more advanced, it quits the ground and climbs up trees and walls, its rootlets becoming holdfasts only; the leaves are generally three- or five-lobed, and it is still barren; this is the "greater barren ivy." In its more matured state, it disdains all props, and rising by its own strength above the wall it occasionally puts on the appearance of a tree; the branches are smooth, and about October and November become loaded with flowers and fruit; the lobes of the leaves are less; this is the "war poet's ivy." When old it again becomes barren; the suckers reappear on the stem; and the leaves become egg-shaped; this is the "Bacchanalian ivy." The parts of this plant applicable for decoration are, the leaf, stem, fruit, and tendril: they are never sculptured larger than their natural size, although they are to be found in the several styles of architectural decoration. In Roman and Grecian examples, the one, and the three, lobed leaves are alone used; either as an enrichment to a fascia, as a band round a drinking cup, as a wreath to decorate the head, or on the top of a thyrus. In all styles the stem is made a feature of equal importance with the foliage; it is accompanied by single leaves placed opposite to or alternate with berries and stalk intermixed, and takes a graceful flowing line. In Gothic architecture, the sculptured representations are confined to the five-lobed leaf. *PIRANESI, Della Magnificenza*, etc., fol., Rome, 1761, pl. 18, gives a shaft; *COLLING, Art Foliate*, 4to., Lond., 1865, pl. 28, 33, 36, 38, 40; the bud, 62, 63, 65. A kind of ivy leaf is modelled on the bronze jambs of one of the doors of the baptistery at Florence, in very low relief, being nowhere raised more than an eighth of an inch from the ground; it is given in *JENKINS and HOSKING, Architectural Ornaments*, fol., London, 1827, pl. iv.

IWANOFF (ALEXJEWITCH) of S. Petersburg, was educated at Rome about 1760, and on his return to Russia was appointed professor at the Imperial Academy of Architecture. On account of ill health he seldom directed personally the buildings for which he made designs. He died in 1802. 68, 69.

IXNARD (MICHAEL D'), born 1723 at Nismes in France, was superintendent of buildings to the elector of Trèves. He reconstructed between 1768-80 the première abbey of S. Blaise, of the Benedictine order, consumed by fire in 1708. This magnificent abbey, situated in the Black forest between Bondorf and Stuhlingen, was suppressed in 1805, and the buildings used as a cotton mill and manufactory of arms. He also constructed 1773 an hôtel at Freiburg-im-Breisgau, for the baron de Sekingen. 69.

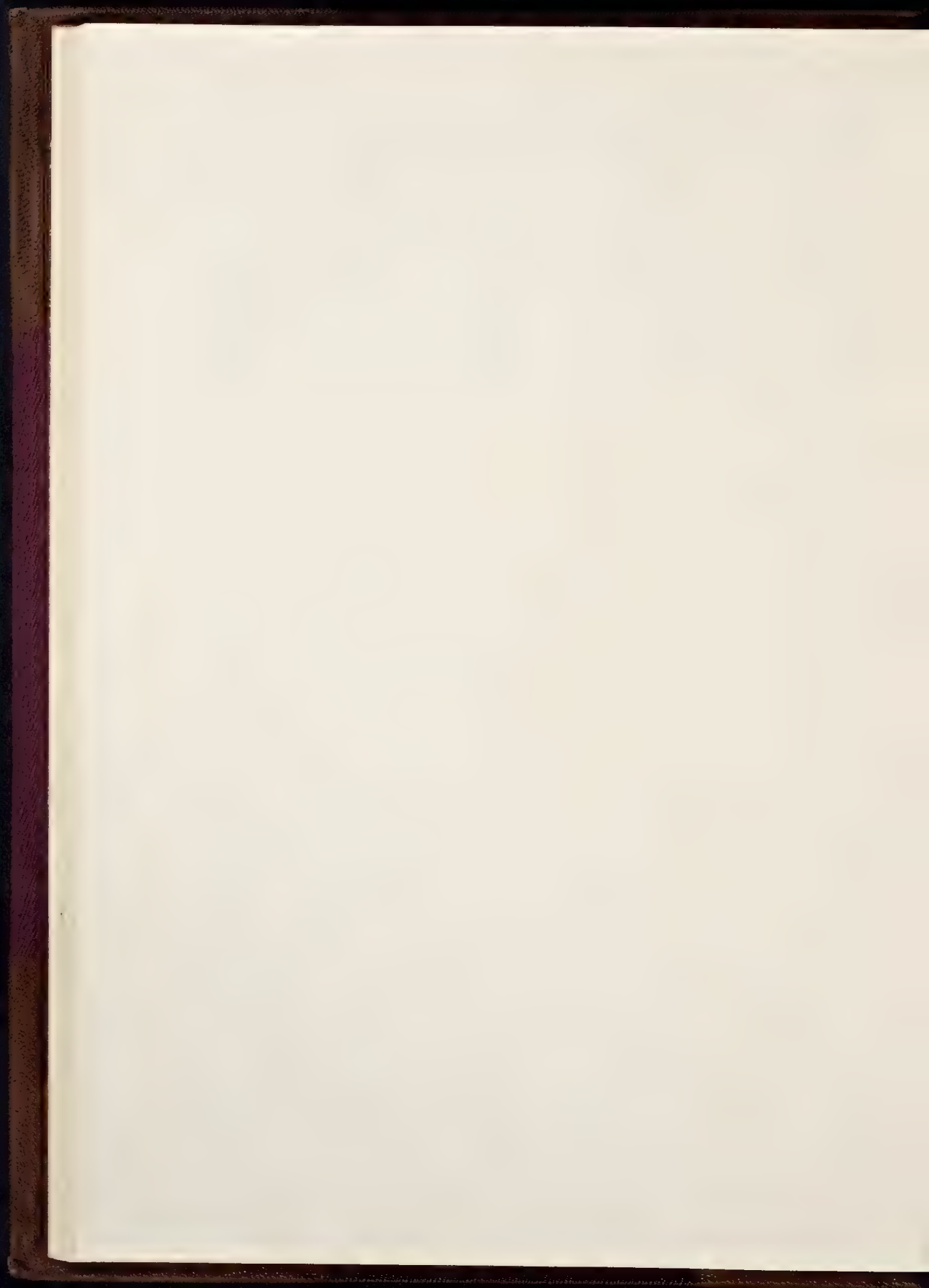
IXNING (MARTIN DE), comptroller of the works of the

new chapel of S. Stephen, Westminster, whose rolls are extant for the 19, 20, and 21 Edward III. He was one of the royal chaplains, and was presented to a prebend in the above chapel 1 April 1351 (pat. 25 Edw. III, cited by NEWCOURT, *Reperitorium*, i, 748). He probably succeeded R. de Pyppeshull, and was himself succeeded by A. de Chesterfeld; BRAYLEY and BRITTON, *Palace*, etc., 8vo., London, 1835, p. 148.

IZAMAL or ICHMUL, the ancient Itzalana. The position of one of the most important of the ancient Indian cities, situated about half a league north of the town of Ticul, in Yucatan, is marked by a series of mounds extending many miles around in every direction; some 40 ft. to 60 ft. high, and about 700 ft. long. Those that had been opened were found to contain chambers with skeletons in a sitting posture with small pots at their feet; the walls and ceilings were quite perfect. Large pieces of hewn stone and pillars were lying scattered around these places, affording ground for the presumption that they were formerly portions of a once great and populous city; NORMAN, *Yucatan*, 8vo., New York, 1843, p. 146. The great

church and convent of the Franciscan monks stands on the platform about 600 or 700 ft. long, of one of these ancient *teocalli* some 40 to 50 ft. above the level of the town, and the open area fronting the church is probably not less than 200 ft. square, surrounded on three sides by an open Italian arcade with niches between the arches; it is approached by two noble flights of steps from two *plazas* on two contiguous sides of the pyramid. On the side of a mound about 200 ft. long, and which formerly had stone and stucco ornaments from one end to the other, is a colossal head in bas relief, shown in CATHERWOOD, *Central America*, etc., fol., London, 1844, pl. xxv; it is 7 ft. 8 ins. in height and 7 ft. wide; a stone 1 ft. 6 ins. long protrudes from the chin, intended, perhaps, whereon to burn copal. WALDECK, *Voyage d'Yucatan*, fol., Paris, 1838, p. 67-70, gives in pl. viii-xvii, the plan of the ruins; the great palace; the pyramid shown by Lord Kingsborough; the four temples around a square with the temple of the sun in the centre; and several terra-cotta heads found in the mounds.

IZQUIERDO (DON F. H.), see HURTADO IZQUIERDO.



DICTIONARY OF ARCHITECTURE.

JACK

JABER, *see* GEYER.

JACA. A city, once the capital of Aragon in Spain, and the see of a bishop. It is well built, surrounded by walls (some Roman portions are still existing) with twenty-three towers and several gates, and has a citadel; there are two squares, and the streets are generally regular and well paved. The "simple solid" cathedral dedicated to Sta. Orosia, was founded by king Ramiro in 814. The capilla de S. Miguel has a superb plateresque portal with foliated columns and medallions in high relief. The city has also three chapels, five convents, a college, two schools, a town and a sessions house, a prison, a hospital, a barrack, and store houses.

About two leagues distant, near the village of Santa Cruz, is an ancient semi-Norman church with a lofty square tower, and three tiers of double-arched windows; a portal and wheel and lettered devices; the grotesque capitals, billet moldings, and two plain tombs, in the interior, and the roof of the *sala capitular*, are also worth observation. 28. 50.

JACANACHERY, built about 800 for Sholun rāya, a temple, dedicated to Narasingha, at Jamagulla in Mysore. It is constructed entirely of *balapum* or potstone, covered on the outside with small images in full relief; but it is neither grand nor elegant. Prince Sholun rebuilt many temples during the twenty years of his penitence; BUCHANAN, *Mysore*, etc., 4to., London, 1807, iii, 389.

JACARANDA OVALIFOLIA, or Green Ebony. This tree is a native of South America, where it is prized both as a hard wood and a dye-stuff. It is of an olive-green colour, is obtained in pieces about three feet in length, and yields olive-green, brown, and yellow colours. ARCHER, *Pop. Econ. Botany*, 8vo., London, 1853, p. 208. This word is also the Portuguese and continental name for ROSEWOOD.

JACK. The name given to a variety of machines used in building operations to move heavy loads, and for which different systems and names are adopted, as follows:—

1. The *bottle jack*, is formed of a large screw, working with a small pitch in a female screw, that is offered by the fixed part of the machinery; being the motion given to the head of the screw by means of levers that work in it. The power of this machine, of course, depends upon the pitch of the screw, and also upon its dimension; it is generally made within the limits of 2 and 20 tons; and is much employed in underpinning operations, for which the manner of communicating the motion to the screw is peculiarly adapted.

11. The *rack and pinion jack* is made either with a double or a single purchase, as it may be required to move heavy, or light, weights. It is easily transported, as it consists of a box or hollowed piece of wood, receiving the rack and pinion working in it; the rack also bears a set of teeth upon both

JACK

ends that are intended to lift the object to which it is applied, or to transmit the motion that is given. Evidently the rate of motion will depend upon the ratio that the wheels of the pinion and teeth of the rack bear to one another; these machines are made of the respective powers of from 4 to 20 tons for the usual operations of trade, though it is sometimes of greater power. This machine is also called the *hand jack*, or *jack in the box*, and is the oldest in use.

111. The *screw and rack jack* differs from the last named modification merely in the substitution of a portion of an endless screw working in the rack instead of a pinion, or a combination of wheels. It is simpler, but is not so powerful as the last named variety, and it is in every respect inferior to the fourth species, of this machinery.

IV. The *hydraulic jack*, wherein the piston-head of the top, of a comparatively large diameter, is made to advance by the pressure of water which is pumped into the cylinder from a reservoir formed on the sides of the machine, and the piston advances in the same manner as does the head of the bottle-jack. The many advantages combined in the hydraulic jacks are causing the extension of their use for all purposes where the works are required to be fixed permanently. They are made of the power of between 4 and 60 tons, and are most advantageously used when the power required is above 20 tons exercised as a dead lift. G. R. B.

The hydrostatic jack, invented by Simmonds of Birmingham, consists of a hollow base acting as a reservoir for the water; the cylinder is cast upon it, and occupies the place taken up in the common jack by the elevating screw. The elevating catch is formed upon the upper end of the plunger rod, and a small brass pump screwed on the side of the cylinder, gives motion to the ram in the same manner as an ordinary hydrostatic press. The actuating lever of the pump oscillates on studs carried by the main cylinder, the whole apparatus being fully as portable as the common screw-jack; and by it one man may easily raise from 15 to 20 tons, four or five times as much as he can move with the screw; PRACTICAL MECHANIC'S *Journal*, 4to., Glasgow, 1848, i, p. 266.

Curtis's patent hydrostatic jack was formed in 1839 for replacing an engine or carriage upon the rail; it was capable of lifting a weight of 8 tons one foot high by the force of one man in five minutes; a woodcut is given in the *CIVIL ENGINEER Journal*, ii, 436.

The *smoke jack*, and the ordinary *bottle jack*, in domestic economy, are small machines for the purpose of producing a rotary motion in roasting meat. The former is set in motion by the draught of the chimney to which the apparatus is affixed; the latter by clockwork. G. R. B.

JACK. A word employed by workmen to describe any

subordinate portion of framing, grooving, etc., which forms the filling-in and supports plastering, or other decoration, but is no part of the main construction. The word is often used by old English writers to mark the difference between the superior and inferior, as may be noticed in many of the following definitions.

JACK ARCH. A term described by GWILT, *Encyc.*, Glossary, s. v., copying STUART, *Diet.*, as "one whose thickness is only of one brick." In the sense of a 9 inch arch the word is now obsolete, if ever it really had that signification. The authors probably meant any cross arch, or filling-in of spandrels which abut against, or are supported by the main arches of construction in groining or other vaulting, and were of as little thickness as possible to avoid general weight.

The term has been applied to the arch in a groin intersecting the main vault. It is also the term used in Lancashire for a "skewback arch."

JACK ARCHITRAVE. The lower fascia of an ARCHITRAVE.

JACKLY (sometimes written IAKLI). It appears from LEAKE, *Asia Minor*, 8vo., London, 1824, 231, that CHANDLER, *Travels in Asia Minor*, 4to., Oxford, 1775, was the first to describe the ruins at Iakli, not far to the southward of Kizeljik or Mendeliat in Anadolia, of a small fortified town containing a theatre; and a temple of the Corinthian order, of which sixteen columns were standing in 1766. The latter was supposed by CHANDLER to have been the temple to Jupiter Labranda: but CHOISEUL GOUFFIER, *Voy. Pitt. de la Grèce*, fol., Paris, 1782-1809, and SERVOIS et BARBIÉ DU BOGAGE, *Voyages de Chandler*, 8vo., Paris, 1806, ii, 248, induced LEAKE to think that Jackly occupies the site of Euromus. An engraving with the title of "Temple at Labranda", is given in FELLOWS, *Journal*, 4to., London, 1839, p. 261. In like manner, although Jackly appears in the index of the work, the text relative to the temple, in SOCIETY OF DILETTANTI, *Antiq. of Ionia*, fol., Lond., 1769, i, 53, is headed "Labranda". From the illustrations therein it would seem that the temple was hexastyle, with eleven columns on each flank 8 ft. 7 ins. apart from centre to centre, and 2 ft. 10.35 in diameter. The base has a double guilchoe in the lower torus, and laurel leaves in the upper one. The shaft, 22 ft. 7.5 high, is fluted (except to the columns on the south side), and on each shaft at 7 ft. 5.55 from the ground is the bottom of a tablet 1 ft. 5 ins. high, recording the name of the person who gave the column with the base and capital. The architrave carries a pulvinated frieze, and the cornice has dentils. The details generally, lead to an inference that the building was never completely finished. The depth of the *parascene*, and three or four flights of seats, mark the position of the theatre.

JACK PLANE. An instrument 16 or 17 ins. long, with an iron or cutting bit about 2 ins. wide, sometimes 2½ ins. This is the first tool used by the joiner in taking off the irregularities left by the saw, or the axe, previous to the application of the "trying" and "smoothing" planes; the edge of the cutting iron forms the segment of a circle of a moderately quick sweep, thereby allowing the centre of the tool to take off a coarse shaving without the corners appearing below the sole of the plane; the coarseness of the work requires that the mouth or opening in the sole should be wider than in any other plane. For wood of a hard or knotty nature, the iron must have less convexity than for wood of a soft clear grain, or it will tear, and the labour be much greater; formerly the cutting iron was used without a cover or "top iron," but now the latter is invariably adopted as the shavings leave the throat more freely and the liability to tear is very much reduced. This plane is worked with short quick strokes within the arms length.

There are three sorts of jack planes; one with a double iron, like a trying plane, but a little narrower and shorter, and with a plan "tote." The second is about the same size, and has a

single iron only, and is used for rougher work. The third is smaller still, and is generally called a "router."

JACK QUARTER. Short quarters filling up the face of a partition between the braced, or trussed quarters, and are intended to receive the laths. They are generally morticed into the cill or head, and cut to fit the bevel of the raking quarters, and either stubbed in, or more commonly, skew-nailed to them.

JACK RAFTER (Fr. *chevron de coupe*). The rafters of unequal length which fill the face of that part of a roof where there are raking hips, or valleys. They are generally birds'-mouthed at one end, and skew-nailed at the other, as the case may require.

JACK RIB. A term defined by GWILT, *Encyc.*, as one "in a groin or polygonally-domed ceiling, and fixed upon the hips." The ribs to sustain the tiercerons and liernes in Gothic vaulting are also called jack ribs by workmen.

JACK SHORE. The term given to the smaller and lower raking timber used in shoring up a building.

JACK TIMBER. A term defined by GWILT, *Encyc.*, as "any timber interrupted in its length or cut short"; but he evidently means diagonally, and not at right angles, in which case the short timber is called a TRIMMER.

JACK TRUSS. The term applied to the half truss abutting against the king or queen posts at the ends of a building, where the roof is hipped; such as that of the long room at the Custom house, London, shewn in LAINE, *Custom House*, fol., London, 1817, pl. 28.

JACK WOOD, properly JAK WOOD.

JACOB, was in the service of the elector Philipp von der Pfalz, and was employed by the town council at Worms, towards the end of the fifteenth century.

JACOB, see JACOPO.

JACOB (ERASMUS) of Schweinfurt, completed 1520 the vaulting of the Annakirche at Annaberg, begun in 1499.

JACOB VON LANDSHUT, see LANDSHUT.

JACOBE (. . .) designed 1801 the maison Weibre, rue de Lille, faubourg S. Germain, at Paris, given in KRAFFT, *Plans, Coupes, etc., Maisons, etc.*, fol., Paris, n. d., pl. 58. The date of his death is not recorded.

JACOBSEAN ARCHITECTURE. A term for the style employed during the reign of James (Jacobus) I. of England.

ELIZABETHAN ARCHITECTURE.

JACOBI (JELLE), appointed town architect of Harlingen, directed the works for enlarging, deepening, and fitting up the harbour of that town in 1782.

JACOBIN FRIARS, see DOMINICAN FRIARS.

JACOB'S STAFF. An instrument formerly used for taking angles, but now obsolete. It differed from the astrolabe and quadrant, inasmuch as it had no plummet or perforated sights. It consists of a straight graduated square stem or 'staff,' on which were three movable cross pieces, 'transomes' or 'cursors'; by shifting these backwards and forwards, angles might be taken. Its construction and use are minutely given in *Master Blunder his Exercises*, 4to., London, 1636, pp. 666, et seq.

BALISTA.

JACOBSEN, not JACOBSON, as often printed (THEODORE), F.R.S., F.S.A., member of the Society of Arts, etc.; a merchant of Basinghall-street; and one of the governors of the Foundling hospital, London. To him has been generally attributed the design for that building; but on "30 June 1742 the plan as approved by the general court was ordered to be executed under the direction of J. HORNE as their surveyor." He designed the Haslar royal hospital for sick and wounded seamen at Gosport near Portsmouth, of which an engraved bird's-eye view exists, dated 1705-60, and a reduced copy in GENTLEMAN'S MAGAZINE, Sept. 1751, xxi, p. 408, at which time only one wing had been completed. It is marked 597 ft. square, with four centres used for a chapel, a council chamber, and two halls. His Will specially mentions his books of archi-

ecture, with a portfolio, and the copper plates, of his own designs. Sir John Soane's museum possesses two plates; one, a plan and elevation of the Foundling hospital, without a name to it; the other, a "section, plan, and elevation of a design for a triangular house, by T. J., esq." Jacobsen died 25 April 1772, and was buried in the vault of his family (who at the time of the great fire possessed considerable property in the neighbourhood of the Steel-yard) in the church of Allhallows the Great, Upper Thames-street, London. WALPOLE, *Anecdotes*, 8vo., Lond., 1862, p. 837; CUNNINGHAM, *Handbook*, 8vo., Lond., 1850, p. 9; GENTLEMAN'S MAGAZINE, xlii, 247.

JACOMETTI (PIETRO PAOLO), born 1580 at Recanati in Italy, was also a sculptor, painter, and founder. He studied under his uncle Calcagno, and his brother Tarquino. As architect he designed the Jesuit church at Recanati; as founder he cast the iron statues for the fountain on the piazza del Santuario at S. Loreto, and those of the baptistery at Osimo. He died in 1655. 112.

JACOPO. There were apparently two, if not three, artists named Jacopo (corrupted at Florence into Lapo). One, perhaps a Florentine, might have lived 1150-1220; another who was employed at Assisi, and whose dates might be 1190-1260; and another who, with his fellow-pupil Arnolfo, accompanied his master Niccolò Pisano to Siena about 1266, and whose dates might be 1230-1300, for the life of Niccolò extended over 1206-78. These have been considered as one artist by several authors; thus DELLA VALLE speaks of Jacopo, a pupil of Niccolò, as employed at Assisi 1228-32 (which are things manifestly incompatible), and born at Florence; VASARI fixes 1218 as the date of a work by Lapo in that city; yet previously stating that his employment there was subsequent to 1232. The dated works ascribed to them may therefore be thus assigned.

To the first, the palazzo di Poppi at Casentino, if it were erected as VASARI says for the husband of la bella Gualdrada, for she lived 1180-90; the church de' Monaci Cassinensi, afterwards called the Vescovado, and now the cathedral, at Arezzo, commenced 1218 by a Jacopo, continued after no slight interruption of the work 1265 or 1275 by Margaritone, and completed by another architect before 1289; and the piers of the ponte della Carraja 1218 at Florence.

To the second, the employment 1228-32 in remodelling the buildings of the monastery of S. Francesco, already commenced by Frate Elia at Assisi: he is called Jacopo Tedesco by VASARI; but CICOGNARA, *Storia della Scultura*, fol., Venezia, 1813, i, 345, disputes the propriety of considering him to have been a German, because the inhabitants of the Valtellina and of the lake district of Northern Italy were called Tedeschi: if VASARI be right in stating that he afterwards settled in Florence, to him must be ascribed the ponte Rubaconte da Mandella 1236-7; the design of the palazzo degli Anziani, afterwards del Podestà, but now del Bargello, commenced 1250-2, altered 1292 and 1345; and the model of a tomb to be erected in the abbey church at Monreale in memory of Frederic II, by order of Manfred, who reigned in Sicily 1258-66. It should be noticed that a prevalent opinion attributes to Frederic, who was emperor 1212-50, the introduction of Jacopo into Italy. The death of this Jacopo is assigned to the year 1262 by VASARI, who erroneously calls him the father of Arnolfo di Cambio del Colle di Val d'Elsa.

To the third, the palazzo di Poppi at Casentino, because AMMIRATO (as stated by VASARI, *Vite*, 12mo., Firenze, 1846-57) shows that the licence for the erection of this palace and castle was not obtained until August 1274; and the drainage of Florence; with the alteration of the level of the piazza di S. Giovanni, for which a brick pavement was proposed 1289; and the introduction of stone pavement into that city.

The dates of the original construction of the palazzo Vecchio at Pietramala, destroyed 1384, with the rebuilt churches of S. Salvatore del Vescovado, and of S. Michele in the piazza

Padella, now called S. Michele Bertelde, or degli Antinori, or SS. Michele e Gactano, at Florence, are not mentioned, so that they may be ascribed to either of the above three architects.

JACOPO DI CIONE, see CIONE (ANDREA DI).

JACOT (. . .), born 1798 at Paris, studied in the école des beaux arts. He resided in S. Petersburg from 1822 to 1840, and was architect to the emperor, and professor of architecture to the corps des voies de communication, for which body he designed the chapel and the buildings belonging to it; the salle de la noblesse; the Dutch church and its offices; many other edifices; and a circus since demolished; DUSSEUX, *Les Artistes Français*, 8vo., Paris, 1856, p. 427. The date of his death is not known.

JACOUM. This name occurs in COSTE, *Arch. Arabe*, fol., Paris, 1839, p. 8, where he states that soon after the destruction by fire of the Kaaba at Mecca, a vessel ran ashore near Djed-dah, in which was everything necessary for the construction of a Christian church in Ethiopia; the cargo with "two architects, one a Copt, the other a Greek named Jacoum," who were on board, were taken to Mecca.

JACQUES DI COMPOSTELLA (SAINT), see SANTIAGO.

JACQUIER (. . .). One of the three mathematicians who recommended the practice of putting chains to the drums and vaults of domes, in 1743. CHIAVERI.

JADE. A name which has been given arbitrarily to several minerals resembling each other but little, except in colour, and therefore it is one which it would be well should fall into disuse. Serpentine, nephrite, and saussurite, have all been described under this name; and *yu*, or Chinese jade, is supposed to be nephrite. 14.

Jade is the 'nephrite' of the old school of mineralogists; it is also known under the name of the *axe* stone, on account of its having been used in the fabrication of axes by the aborigines of New Zealand, before the introduction of iron by European settlers. It is found in Hungary, Siberia, the United States, Canada, Egypt, China, etc.; the Chinese jade being much prized for ornamental sculpture. Its surface is smooth, but the fracture is splintery; it has a greasy feel, and its colour is a dark green, somewhat resembling that of a leek; in hardness it approaches very nearly to quartz, and it is extremely difficult to work or carve, owing to its tenacity, and to the peculiar cleavage; under the blow-pipe it fuses easily and with a slight ebullition, into a ball of white semi-transparent glass. Its analysis differs very much, according to the locality from which it is derived; but the constituents of jade are for the most part silica, carbonate of magnesia, iron, alumina, carbonate of lime, with occasional mixtures of chrome, oxide of manganese, soda, and potash. The Chinese carvings in this mineral are esteemed as much as the sculptures in quartz; they are of chains, light ornaments, and other kinds of jewelry ornamentation. HUMBLE, *Dictionary of Geology*; JAMIESON, *Characteristics of Minerals*. G. R. B.

JADPOOR, in Hindostan, see JODPOOR.

JAEN (Auringis Giennium of the Romans). The capital of the province of the same name in Spain; situated on the river Jaen; is the see of a bishopric united with Baeza. The old town, which still shows some remains of Moorish walls and towers, consists of very irregular, narrow, steep, and winding streets. Those of the new town are generally spacious, with well built houses; the latter in the suburbs having good gardens. The largest and best built squares are those of Sta. Maria, S. Francisco, and the Mercado; the Carrera, joining the two latter, is the most spacious. The mosque or old cathedral was pulled down 1492. Of the present building, dedicated to the Assumption, the foundation was laid 1500 of the Gothic *capilla mayor*, finished 1519. A new design for the cathedral was made 1534 by P. de Valdelvira, who began it in 1540; the south front, the chapter-house, the *panteon*, the sacristy, and the chapels on the epistle side were continued by his son Andres till his death

1579. The work went on slowly for want of funds, under the pupil of the latter, A. Barba. In 1634 the *capilla mayor* was pulled down; 1634-54 J. de Aranda finished half the church up to the last pillars of the *coro*, and the north portal. 1654-60 F. de Portillo succeeded him, and 1660 the church was considered complete enough for consecration and use. 1667-84 E. Lopez added the piers and chapels that were still wanting; the towers; and the principal front 200 Spanish ft. wide including them, and 69 ft. high, having eight engaged Corinthian columns. In 1765 the elliptic *capilla del Sagrario* or parish church in the building was designed by V. Rodriguez and executed by M. Godoy. The cathedral is 308 Spanish ft. in length, and 158 ft. wide including the three aisles and the (seven) chapels on each side; the nave is 50 ft. wide and 95 ft. high; the aisles 35 ft. wide; the height in the lantern of the dome is 175 ft.; the towers are 41 ft. square, and 225 ft. high to the ball; the style of architecture is after that of its metropolitan at Granada and Malaga. "The structure is interesting," says FERGUSON, *Modern Styles*, 8vo., Lond., 1862, p. 135, "from its plan being arranged in a manner peculiar to Spanish cathedrals, but not found in any earlier example, though frequently afterwards"; he gives a woodcut of the capitals and entablature of the richly decorated interior Corinthian order. Seven parish churches, several of them large structures; several suppressed monasteries the buildings of which form conspicuous objects, perhaps comprising the portal 1578 of the church of the Dominicans with their magnificent cloister of thirty-six columns; and the church 1667-84 of the Carmelites descalzas by E. Lopez at his own expense; four existing nunneries, the church 1606-21 of that of Sta. Clara is by J. B. Monegro; the episcopal palace; the college; the museum; the diocesan seminary; schools; the general and foundling hospitals; the theatre; the buildings of the Inquisition; the new *plaza de toros*, completed 1847 for 8,000 persons; the portal of S. Miguel by Valdelvira; the plateresque *altar mayor* at La Merced; the palace of count Villar don Pardo; the portal of that of Suarez de la Fuente el Sauce; and the house of los Masones, are amongst the structures worthy of notice. XIMENES PATON, *Historia de la Ciudad y Reyno de Jaen*, 4to., Jaen, 1628. 28. 50. 66.

JAGGREE or JAGGERY. The warm dark coloured sugar obtained from the *cocos nucifera* or common coconut palm, found in all the tropical parts of the world within reach of salt water. When mixed with lime, etc., it forms a powerful cement; CHUNAM. ARTOCARPUS.

JAGO DE COMPOSTELLA (SAINT), see SANTIAGO.

JAGO DE GUATEMALA (SAINT), see GUATEMALA.

JAGO DE LEON DE CARACAS (SAINT), see SANTIAGO.

JAINIST ARCHITECTURE. The sect of the Jains does not become of importance in the History of India until so late a period as the ninth century of the Christian era, although, as suggested *s.v.* Indian Architecture, it may have been a compromise between Buddhism and Brahminism during their long struggle. Its origin and its tenets seem to be unknown to those, who profess to have studied the religious faiths of the natives of India. In its denial of the divine origin of the Vedas, and its worship of twenty-four saints or deified teachers, some authors see a resemblance to Buddhism, which involves principles that are antagonistic to Brahminism. Others infer that a decided difference from Buddhist doctrines is evident in the fact, that after its own saints it respects the Hindoo mythology, and that the Brahmins not only allowed it to exist when they persecuted the Buddhists, but in the fourteenth century considered that there was no distinction or contradiction between it and their Vishnute faith. Perhaps these writers had never gained the confidence of a worshipper sufficiently to enable them to speak with so much authority on the subject as HEBER, *Journey*, 4to., London, 1828, i, 292, who describes his visit to a Jain temple as "consisting of a succession of six small rooms, each having an altar and sculptured altar-piece. The most remote of these bas-reliefs contained twenty-five male

figures sitting cross-legged; one representing a negro and considerably larger than the others: this, the priest said, was their god; the others being the several bodies, which he had assumed at different epochs when he had become incarnate to instruct mankind. The Jain theology, consisting of the doctrines he had thus delivered, are represented to be highly moral maxims; and the progress made by any one in these mysteries decides his right to enter these sanctuaries." Another Jain temple at Kairah, is described ii, 157, with a woodcut at p. 515. Not counting the deity, the successive altar-pieces seem to contain four, eight, twelve, eighteen, and twenty-four of these Jain *torthankaras* or incarnations (each is mentioned with the prefix *jina*, 'victorious', whence the peculiar name of the sect), of whom the two last were Parswanath who died about 850 B.C., and Mahavira who died about 600 A.C., having been the preceptor of Sakya Sinha Gotama Buddha. At any rate, it is clear that, if nothing is known of its origin and progress until the eleventh or twelfth century, it seems at this period to have stood between declining Buddhism on the one hand, and rising Hinduism on the other, the temporary ruler of the continent of India, extending its influence from Guzerat, its principal seat, to Delhi on the one hand, and to Cape Comorin on the other. Thus it remained till the Indians, subjugated by the Mahometans, lost even this faith, which is lower than Buddhism in its most degraded days, and sank by degrees into the depth of that monstrous superstition known at present as the Hindu religion: FERGUSON, *Handbook*, p. 69. It now flourishes chiefly in Guzerat and in the Mysore, where a Jain temple is known as a *bustri*.

Passing, as not very interesting, the Indra Subha group of caves at Ellora, which resemble Buddhist caves without cells, a few caves at Khandagiri or the western hill in Cuttack, and in the southern parts of India, as well as the cells with *torthankaras* at the fort of Gwalior, and noticing that the mosque which was a temple before 1025 at Sonmuth and some temples about Ahmedabad appear to possess considerable antiquity, the same author affirms that the oldest Jain monuments are probably those about Joraghur in Guzerat. On Mount Abu in that district are several Jain temples, of which two at Dilwarra are remarkable for being of white marble on a granite mountain between 5,000 and 6,000 ft. high. The older of these dates 1032, and is shewn in FERGUSON, *Pict. Illustr.*, pl. 9. The more modern edifice was built 1197-1247, and is given (with some want of care imputed to the view) in TOP, *Western India*, 4to., London, 1839, who also p. 127-34 furnishes three illustrations of some of the edifices at CHANDRAYATI. The most flourishing period of Jain architecture was 1418-68 under Khumbo Rana of Oodipore, who, amongst his civil and ecclesiastical structures, erected 1439 the temple to Adinath or Rishabdeva at Sadree (plan in *Handbook*, p. 79; view in *Pict. Ill.*, pl. 10), which exhibits the Jain spires in combination with domes, and furnishes one of the few examples of their external appearance. The Jain remains at old Delhi form the most picturesque and interesting group of ruins now found in Northern India. To these must be added notice of two towers erected in the fort at Chettore, one, the Khowasin Shambu about 896, for some unknown purpose, given in the *Pict. Ill.*, pl. 8; the other by Khumbo Rana in memory of his victory 1439, shewn in the *Ill. Handbook*, p. 82, *Pict. Ill.*, pl. 11. In the few buildings of Jain civil architecture there is nothing to distinguish them from those of the Hindoos; but the temples, according to FERGUSON, are still the most pleasing and elegant specimens, at least of internal architecture, that are now to be found in India. In pl. 13 and 14 the Rajsamundra bund 1653-80, and the Jaysamund bund 1680-99 in Oodipore, are given.

The Jains, like the Hindoos, continued the style used by the Buddhists; three things appear to mark a progress or a phase of change: the weight of a stone lintel is apparently if not really taken at its centre by a pair of struts evidently imitated from carpentry to bracketed capitals, which now become cor-

bels and require that the shaft should carry another shorter but complete pillar with brackets under the beams: the pedestal of the shaft is no longer square; it is broken into a square with four arms on its plan; the base is octagonal; the shaft is round or sided, or faceted and banded; the capital is low and hardly distinguished; the die for the brackets is round or octagonal; and finally, the Jain architects invented the coffered ceiling, called a dome by FERGUSON, in which triangular slabs effect a reduction of bearing in each direction alternately, and the result gives concentric rising bands or rings of ornament, lessening in diameter and sometimes finishing with superb ornaments pendent from the centre. The modern inhabitants of Hindostan have attenuated the strut until it is too delicate for its purpose and has lost its meaning; and have preferred multiplication of columns with flat ceilings to the Jain coffers or caissons. HOPE and FERGUSON, *Architecture of Ahmedabad*, 4to., London, 1866, give many views (photographs) of the Jain buildings in that city. BUCHANAN, *Mysore*, 4to., London, 1807, iii, 140, stated that Sravana Belgula was the principal seat of Jain worship. BETTA; BOGLIPORE; DAILWARRA.

JAIPOOR, see JEYPORE.

JAK WOOD, called *orange wood* from its colour, and also *Jaack wood*, *Jack wood*, and *kuthul*. The wood of the *ARTOCARPUS integrifolia*, the bread-fruit tree, imported in logs from 3 to 5 ft. diameter, and also in planks. The grain is coarse and crooked, and often contains sand; it is of a yellowish colour when first cut, but changes to a dull red or mahogany. As the timber is not subject to be attacked by the white ant (BLACKIE, *Gazetteer*, s. v. Ceylon), it is very much used in India for almost every purpose of house carpentry and furniture; also in England for cabinet work, marquetry floors, and for turning; HULTZAPFEL, *Cat. of Woods*, 8vo., London, 1843, p. 88; ARCHER, *Popular Economic Botany*, 8vo., London, 1853, p. 331.

It is also the name of a description of East Indian dicotyledonous wood sometimes introduced into England, where it is principally used by turners, and by cabinet-makers, when varieties of wood are required to be employed. The name is also applied to a description of South American wood, which is used as a curiosity; the latter variety is different in colour from the East Indian, it being somewhat of a rosewood, whereas the East Indian wood is of a dirty yellow. It is very liable to split and to warp; its scantling is about 9 ins. square and about 16 ft. long. The annual rings of the tree's growth are not very distinctly marked in either of the varieties.

G. R. B.

JALI and ZINIRI. The Indian terms for trelliswork cut in stone. Eight plates of examples are given in KITTOE, *Indian Arch.*, fol., Calcutta, 1833-40.

JALIBAN (MIR MAHOMED), was the architect of Baber, the conqueror of India, who rewarded him "for successfully executing his noble design of throwing a bridge over the Ganges, before he had been three years sovereign of Hindustan": TOB, *Annals of Rajasthan*, 4to., London, 1829, ii, 630; and probably in LEYDEN and ENSKINE, *Life of Baber*, etc., 8vo., London, 1844.

JALOUSIE (It. *gelosia*; Sp. *celogia*; Fr. *jalousie*; Ger. *jalousie*). A French term for that species of blind formed of laths, commonly called a VENETIAN BLIND, which can be drawn up and down by lines passing through holes in the laths, in order to intercept the rays of the sun whilst admitting a current of air; and are also reversible, so as to have the upper sloping surfaces falling outwards or inwards. The outside window blinds so commonly used on the continent, which consist of frames hung folding, filled in horizontally with bevelled laths, are called in France *persiennes*, in Italy *persiani*. The hooks at the side, which are necessary to secure the cord when the blind is partly let down, have lately been done away for a sort of snatch block inserted in the top lath.

A. A.

There is a neat light species of rolling blind, analogous to

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the Venetian, made in America, consisting of laths about $\frac{3}{8}$ ths of an inch broad, by $\frac{1}{8}$ th thick, with a stouter lath at bottom, the whole connected about $\frac{1}{8}$ ths apart by several pairs of thin hard strings, which embrace the laths and are twisted together between them, the whole being generally painted a black, or a very dark green, colour.

J. W.

JALLIER (J. B. C.), born 1737, was a pensionnaire of the French academy at Rome, and on his return appointed architect of the conservatoire des machines. He died at Paris 1806.

JALUBI, of Toledo, practised at the time of the Moorish domination in Spain. Prince Nazar or Naser (1180-1225) called him to Seville to direct, together with other architects, the works of the Alcazar, or palace and fort, of that town. 66.

JAM and SALJAM. Wood obtained from the CALYPTRANTHES.

JAMA, DJAMA, and ALJAMA. The Arabic name for the principal mosque in a town, according to GIRAUT DE PRANGEY, *Arch. des Arabes*, 8vo., Paris, 1841, pp. 4, 6, 11, 24; "Mesjid" being the name for the ordinary mosques. But EVLIYA, *Travels*, 4to., London, 1834, i, 45, ii, 103, calls it a "place of meeting", meaning a very large mosque.

JAMAGULLU, in Hindostan, see HULLYBEDU and JACANACHERY.

JAMAICA STONE. A stone called Portland stone, from the estate of Portland, in Jamaica, was exhibited at the French Exhibition 1855 as turned by common wood-cutting tools. A similar stone is called Southampton stone. The even texture and extremely clean arris which these materials present, may probably cause its introduction for decorative work. PAPWORTH, in *Transactions of the Institute of British Architects*, 1855-6, p. 14; *BUILDER Journal*, xiii, 408.

JAMB (Gr. *αντιπηγιά*; Lat. *antepagmentum*; It. *gamba*; *pilastrò*, *sperone*; Fr. *jambage*; Ger. *pfoste*; Dutch, *zydelposte*). The vertical side of any opening, as of a door, window, chimney, etc. As its derivation imports, it is the *leg* by which the superincumbent weight is sustained. Thus door-jamb, window-jamb, chimney-jamb, etc., are terms constantly used.

A. A.

JAMBBA (MARTIN), as resident architect, conducted some time before 1601 and till 1613, the construction of the alcazar at Toledo, after the designs of Juan de Herrera. 66.

JAMB LINING. The lining, generally of wood, placed on the side of an opening. In mediæval work, and in modern imitation, the rebated jambs were, and are, worked out of the solid door quarters, or door posts. In modern joiner's work it is found much more convenient to fix framed and rebated jambs to them, as the least settlement of the posts in the former system affected the truth of the work. Jamb linings to doors are 'double' or 'single' rebated and beaded, according to the quality of the work, and are blocked out and nailed to the wood bricks, or plugs, or grounds, or door quarters, as the case may be. In superior work they are paneled and molded. Where there is no door to the opening, the jamb may be worked in stone, or covered with cement, and perhaps worked in panels, as above.

A. A.

JAMB MOLDING. In mediæval work, the term applied to one or more moldings on the sides of doors, windows, etc., as contradistinguished from those on the heads. Of course, where this is the case, there is a discontinuous impost. The word is spelt *jaumes* in the accounts in 1523, given in BAYLEY, *History of the Tower*, 4to., London, 1821-5, pt. i, app. xvii. In Pointed architecture, these stones are more or less molded, and shafted, and in window openings they form the lines from which spring the tracery work. These are to be found in most publications on that style, and many Byzantine examples from S. Mark's at Venice, are given in RUSKIN, *Stones*, etc., 8vo., London, 1853, iii, 223, *et seq.*

JAMB POST. A term defined by GWILT, *Encyc.*, copying STUART, *Dict.*, as "the post introduced on the side of a door to which the jamb linings are fixed." It is now generally called a 'door quarter'. The posts are usually placed to open-

ings in the basement, to receive outside doors, and to doors in timber partitions.

A. A.

JAMB SHAFT. The small column on the sides of doors, windows, etc., in mediæval work. It is sometimes detached, and formed of Purbeck or other marbles, but is often worked out of the solid and engaged about an eighth of its diameter, or only as much as will prevent its being broken off by accident.

COLONETTE.

A. A.

JAMB STONE. The piece of stone out of which jamb moldings and shafts are worked. It should be well bonded and joggled to each other stone, and cramped to the main walling. When the latter is executed in rubble work, it is a good plan to connect it thereto with long pieces of strong iron hoop-
ing.

IN AND OUT BOND.

A. A.

JAMES (JOHN) "of Greenwich", succeeded to N. Hawksmore 1705 as clerk of the works (in 1725 he is called surveyor) at Greenwich hospital, a post held by him under Wren, Vanbrugh, Campbell, and Ripley, until his death shortly before 30 May 1746, the date of proving his Will; he was succeeded by W. Robinson (*GENTLEMAN'S MAGAZINE*, 1746, xvi, 273). He translated into English, PERRAULT, *Treatise of the five Orders of Columns*, fol., London, 1708; Pozzo, *Rules and Examples of Perspective proper for Painters and Architects*, fol., London, (cir. 1710); and LE BLOND, *The Theory and Practice of Gardening*, 4to., London, 1712; he likewise published *The Survey and Demand for Dilapidations in the See of Canterbury, justified against the cavils—contained in some letters—published by Mr. Archdeacon Tenison*, 4to., London, 1717, apparently a reply to *True Copies of some Letters occasioned by the Demand for Dilapidations*, etc., part 1, 4to., London, 1716.

He designed 1710 the house (afterwards called Orleans house) at Twickenham, on the banks of the Thames, for the Right Hon. James Johnstone, secretary of state (to which Gibbs added the octagon room; CAMPBELL, *Vitruvius Britannicus*, fol., London, 1724, i, pl. 28: iii, pl. 41, may be another house by him): 1713-15, the body of S. Mary's church, Twickenham; and 1713-24, consecrated 1725, the church of S. George, Hanover-square, with seats for about 800 persons, which is 100 ft. long, 60 ft. wide, and 45 ft. 6 ins. high; the steeple being 100 ft. high.

About 1711 Jennings, the master carpenter at S. Paul's cathedral, was displaced by the commissioners, and "Mr. (John?) James then employed on Her Majesty's works at Greenwich" was appointed as his successor, at a salary of £200 per annum (BIRTON and PUGIN, *Public Buildings*, 8vo., London, 1825, i, 15, from the pamphlet *Frauds and Abuses of S. Paul's*, 8vo., London, 1712). In 1716 he was "assistant surveyor" at S. Paul's, in which office of "surveyor" he was succeeded on his death by Wm. Glanville, surveyor of the admiralty, victualling, and navy, offices (*GENTLEMAN'S MAGAZINE*, 1746, xvi, 273). On 6 January 1716 he was appointed surveyor (succeeding Gibbs) to the commissioners for building new churches, an office which he held as late as 1737, with Hawksmore as his colleague. On 20 January 1725 he succeeded W. Dickenson as surveyor to Westminster abbey; and is stated in March 1736 to have succeeded Hawksmore as "principal surveyor" in the office of H.M. works, etc.; but this latter statement is doubtful.

The estate of Wricksmarsh, near Charlton and Blackheath, having been sold 1721 to Sir Gregory Page, Bart., the old mansion was pulled down, and James designed and built for him "in one year, at a great expense, a very magnificent structure of stone, consisting of a centre and two wings united by a colonnade." This edifice was sold by auction 1787 to John Cator to be taken down (LYSONS, *Environs*, 4to., London, 1796, iv, 329): the plan is said to have been copied from that of Houghton, with some few alterations (WOOLFE and GANDON, *Vit. Brit.*, fol., London, 1767, i, pl. 64-5). The first additions to the old East India house, Leadenhall-street, are stated to have

been built under his directions (*GRUB STREET JOURNAL*, No. 238, July 18, 1734); he rebuilt the belfry story of the tower of S. Margaret's church, Westminster (same *Journal*, Nos. 267, Feb. 6, and 271, March 6, 1735; and *DAILY JOURNAL*, Feb. 28); he also rebuilt Bishopsgate gate (LANGLEY, *Builders' Prices*, 8vo., London, 1748, p. 246); and published *Review of Pamphlets and Schemes for the Bridge at Westminster*, 8vo., London, 1737 (replied to by B. LANGLEY). He drew "the north-west prospect of Westminster abbey with the spire designed by Wren", which was engraved by Fourdrinier; and by Toms for MAITLAND, *History of London*, fol., Lond., 1756.

The following works have been attributed to James, but without sufficient authority. Canons in Middlesex, for the duke of Chandos, 1712-20, but probably erected by J. Gibbs (*BUILDER JOURNAL*, 1864, p. 18, 41, 85; the *Beauties of England and Wales* states that "Gibbs, James, and Sheppard were employed at Canons"). The wings on the north side of Cavendish-square, for the duke of Chandos, cir. 1720, but these were probably built by Shepherd; while the plate "Elevation of a new house for the duke of Chandos in Marylebone-fields, designed by John Price, architect, 1720", appears to give another architect; and the church of S. Luke, Old-street, 1732-3, is by G. Dance, sen. (an author has stated "by a Quaker in 1730"). The church of S. Alphage at Greenwich 1711, consecrated 18 or 29 September 1718, having a frontage of 76 ft. (a measured drawing of the front elevation by T. L. Donaldson, cir. 1811, is in the library of the Inst. Brit. Archts.) is usually attributed to James, but a large and rare plate, of the period of the erection of the church, has on it "designed by N. Hawksmoor, A.D. 1714." This print (as described by Mr. Richardson of Greenwich, from one in his possession) shows a different steeple to that now standing, for it was left intact when the old church fell down. The parish register first records the name of James, as in connection with the first stone of the new steeple, May 1730. Sir J. HAWKINS, *Life of Johnson*, 8vo., London, 1787, p. 374, remarks that "James and Kent were mere decorators, and could do little more than design a saloon, a gallery, or a screen." James died in 1746 as above stated. His Will directs that his property at Eversley near Southampton, some land adjoining it, and a house at Croom's-hill, Greenwich, be sold for the benefit of his widow Mary. A married son had previously died.

W. P.

JAMIN (FRANÇOIS) designed or worked about 1600 at the portal of the façade on the place d'armes of the château de Fontainebleau, for Henry IV; the other architects of this reign engaged on the building are not known: AICARD, *Patria*, 8vo., Paris, 1847, p. 2171.

69.

JANEIRO, in Brazil, see RIO DI JANEIRO.

JANINA or **YANINA**, in Albania, see JOANNINA.

JANSEN (BERNARD), was probably a relative of "Jan Janssen of S. Martin's-in-the-Fields, stone cutter" who set up a tomb at a cost of £16:10:0 for Paul D'Ewes, in the church at Stowlangtoft, Suffolk, the agreement for which is dated 25 June 1624, and exists in the *Harl. MSS.* No. 98, art. 20. WALPOLE, *Anecdotes*, states on the authority of Vertue, who was told by Stoakes, a kinsman of N. Stone, that B. Jansen "was engaged on many great works here; he built Audley inn, and the greater part of (Northampton, afterwards) Northumberland house except the frontispiece." This building was erected about 1605; and the first named in 1603-16 (a plan of it is given in Thorpe's volume of drawings in Sir John Soane's museum); but from the statement s. v. HOWARD, it would appear that Jansen was only the mason employed, which would probably be confirmed by the following statement from the pocket-book of N. Stone, as given in WALPOLE; "In November 1615 Mr. Jansen in Southwark and I did sett up a tomb for Mr. Sutton at Charterhouse,—I made all the carven work"; and "1620 at Redgrave church, Suffolk, I made two pictors of white marbell of Sir N. Bacon and his lady, and they were layed upon the tomb that Bernard Janson had made there."

Cornelis Janssens of Amsterdam was practising as a painter in England between 1618 and 1648; and a Theodore and an Andrew Janssen are recorded as having warrants of denization 1682 and 1687, in COOPER, *Foreign Protestants*, etc., printed for the Camden Society, 8vo., London, 1862, pp. 36, 51; the family is stated, p. xxv, to be still flourishing in London and elsewhere. ROBINSON, *Hatfield House*, fol., London, 1833, p. 14, attributes to Jansen, Charlton house, Wiltshire (cir. 1600-26), and Lulworth castle, Dorsetshire (1588-1609), as well as Audley End, Essex, all three quadrangular houses, and all built for the same Thomas Howard, earl of Suffolk, who had erected Northampton house. WALPOLE, *Anecdotes*, 8vo., London, 1862, pp. 240-1-8.

JANUA. The precise meaning of this Latin word is not clear. It occurs in VITRUVIUS, vi, 8, "atria proxima janui", where it may mean either door or doorway. That there was an obsolete word *janus* for a covered passage with two entrances, as the *janus medius* in the former (HEINDORF, *Ad Horat. Sat.*, ii, 3, 18), or for a doorway with *janua* for the door, is suggested by a passage in CICERO, *De Nat. Deor.*, ii, 27, "ex quo transitiones pervia; Jani; foresque in liminibus profanarum ædium, januæ nominantur." There can be no doubt that LIVY, v, 13, mentioning "totâ urbe patentibus janui", uses the word for a doorway. But in both cases the external or principal entrance is meant; the word OSTIUM seems to have been used for the doorway or door of a chamber until a late period.

JANUARIUS, whilst in the service of pope Adrian I. (A.D. 772-95), superintended the restoration of buildings at Rome, especially those of the basilica of San Paolo. 56.

JANUS (PASSAGE, erroneously called TEMPLE, TO). A proper name supposed to be derived from *janus*, a gateway, or *vice versa*. This passage with two entrances, was usually called Janus Geminus, Janus Bifrons, Janus Quirinus, or Portæ Belli, and stood ad infimum Argiletum, close by the forum. In later times it was often called a temple, but probably in a wider sense of the word, that is, as a sacred place containing a statue of Janus. The identity of Janus with the sun was commonly expressed by his indicating with the fingers of the right hand the number 300, and with those of the left, the number 55 (PLINY, *H. N.*, xxxiv, 7). The myths connected with shutting the gates of the temple to Janus in time of peace, and opening them by the consuls when the senate decreed some conquest, proves that the derivation is correct; for the essential attribute of the deity is recognised—that of opening and shutting: the closing the old and commencing a new year, was another of his functions. He has been called by a poet the founder of Rome. The figure of this double-headed god, Janus Bifrons, occurs on at least one undoubted British coin, as engraved in the *ARCHÆOLOGICAL Journal*, 1851, vi, 30. 59.

PROCIPIUS has given the best description of the temple to Janus, the national deity of Latium. It was once a gate, built by Quirinus or Romulus, in the primitive city of Romulus and Numa; NARDINI, *Roma Antica*, 8vo., Rome, 1771, p. 13, 256, 329, has given it in his third volume, and MONTFAUCON, *Antiquité expliquée*, fol., Paris, 1719, ii, pl. 4, both from ROSINUS, *Antiq. Rom. Corpus*, b. 2, c. 3, 4to., Amst., 1743, giving an elevation of a Janus from a bas relief. VIRGIL, *Æneid*, vii, 607, has described the ancient rite. NIEBUHR, *Hist. of Rome*, by HARE and THIRLWALL, 8vo., Lond., 1847, i, 292, gives the following explanation of the ancient Janus. Old Rome was situated on the Palatine,—the Pomærium of Romulus was surrounded, not by walls, but by a rampart and ditch. At that time there was, on the Quirinal and the Tarpeian rocks, the Sabine town which likewise had its Pomærium. Between the two ramparts and ditches was the via sacra. On this stood the Janus Quirini, a gateway, which was *bifrons*, turned on one side toward the Roman, and on the other toward the Sabine town, closed in time of peace, because it was not then wished that there should be any intercourse between the two cities; open in war, because

they were bound by their league to support each other; GIBBON, *Decline and Fall*, etc., 8vo., London, 1854, iv, 412. NIEBUHR, *Lectures on Ancient Ethnography*, 8vo., London, 1853, ii, 61, states that Roman gates "had two arches by the side of each other, the one called *Janus dexter*, the other *Janus sinister*; by the former people left the town, and by the latter they entered it. The *porta Trigemina* must have had a threefold Janus, the third being either for vehicles or for mere ornament."

DONALDSON, *Arch. Numis.*, 8vo., London, 1859, p. 48, gives a representation of a temple on a large brass coin of Nero, and adds, "as here represented, the Janus is in perspective showing the side and end, and is a mere cella of an oblong form, having pilasters at one end; the whole space of the opening between being occupied by a large single valved door.—The many varieties of this medal—all essentially give the same general features. A large square archway near the arch of the Goldsmiths in the Forum Boarium at Rome, and which is penetrated on both its axes by an archway, is traditionally identified as a Janus". It is shown in ROSSI, *Roma Antica*, 8vo., Roma, 1706, p. 285.

JAPANESE ARCHITECTURE. The chief towns of NAGASAKI, OHOSAKA, YEDO or YEDDO, and YOKOHAMA, as detailed herein, will afford sufficient notice of its peculiarities. MACFARLANE, *Japan*, etc., 8vo., London, 1852; OSBORN, *Japanese Fragments*, 16mo., London, 1860. An article on *Japanese Ornamentation*, its peculiar style being shewn in some cuts, is given in the *BUILDER Journal*, 1863, xxi, 308, 364, 423.

JAPANING. The process of japaning iron is sometimes resorted to for the purpose of imitating the system of the application of this process to *papier maché*; or for the preservation of the metal from rust. It is effected by pickling the plates of iron, fashioned in the first place to the shapes required, and then applying a composition of colour conveyed in a vehicle of the best descriptions of gums, such as shell lac, gum arabic, and copal varnish; and is then completed by being exposed to about 300° Fahr. This is the ordinary mode of japaning; but better descriptions of work are polished up by hand (chiefly by women), and a second coat is applied with great evenness: colours are subsequently added, conveyed with a vehicle of varnish, and dried at the temperature described. This description of painting is supposed to have been derived from the Japanese, who certainly at an early period were masters of the art of applying it to their paper trays and other ornaments. Japaning is also occasionally applied to copper, tin plate, or other metals. Asphaltum is used as a component of japan varnish. PARKER and STALKER, *Treatise on Japaning and Varnishing, with the best way of making all sorts of Varnish, method of Gilding, Burnishing, and Lacking, etc., with 100 Designs for Japan-work*, fol., Oxford, 1688. G. R. B.

JAQUES, also written JAKES. A late English word for a privy; as used in 24 Henry VIII, "I'm, for a nother chambré on the left hande, a frame of a dore made to be sett in a stone walle for a jaques, and a dore made to the same frame, and more, a stoole made to the same jaques, these ij chambres standyng benethe in the lytell yarde nexte unto the kyng's cellar"; BAYLEY, *Tower of London*, 4to., London, 1821, i, app. xxi. DRAUGHT.

JAR, see POT, and POT CONSTRUCTION.

JARA ASSÚ, Leopoldinia major, or greater *jara*, a palm tree of the Western Amazons, grows to a height of 30 ft., with a stem of 4 ins. in diameter. The leaves of the *L. piassabá* are used for thatch, and its hairy covering for cables which do not sink in water. *Jara miri*, Leopoldinia pulchra, or little *jara*, grows from 10 to 15 ft. in height, and about 2 ins. in diameter. It is used for the rafters of cottages on the banks of the rio Negro, and for fencing round yards. WALLACE, *Palm Trees*, 12mo., London, 1853.

JARDIN (NICOLAS HENRI) was born 1728 at S. Germain-des-Noyers in France. He studied in Italy, and published at

Rome some plates of subjects taken from the ancient ruins. On his return to Paris 1754 he was invited by king Frederic V to Copenhagen, where he was appointed professor of architecture at the royal academy, and shortly afterwards intendant of the royal buildings. He designed for the king, the royal church founded in commemoration of the tercentenary anniversary of the house of Oldenburg. The foundation stone was laid 30 Oct. 1740 (or 49), but the work progressed very slowly; and JARDIN left it unfinished on his return 1771 to his native country. According to WEINWICH, *Historie i Danemarch*, Copenhagen, 1811, the building was then still unfinished; it is circular with a dome larger than that of the Invalides at Paris, and is constructed entirely of white Norwegian marble; the bases, the Corinthian capitals, and other ornaments, were to be of gilt bronze. Engravings by Rosenberg 1763, and by Haas 1765, are published in the *Cabinet d'Estampes, Copenhagen*; and in PONTOPIDAN, *den Danske Atlas*, 4to., Copen., 1763-67, ii, 194. JARDIN also designed 1762 the château de plaisance de Bernstorff at Jägersborg (*ibid.*, p. 230); the palace of Amalienborg; that of count Moltke; the hall of the knights in the castle of Christiansborg near Copenhagen, considered one of his best buildings; and the decorations, triumphal arches, and the catafalque for the king, which last have been engraved. He was elected a member of the academy of architecture at Paris in 1771; and knight of the order of Saint-Michael. He died at Paris in 1802. DUSSEUX, *Les Artistes Français*, 8vo., Paris, 1856, p. 208-9. 69.

JARDIN (LOUIS HENRI), a younger brother of Nicolas, born 1730 at S. Germain-des-Noyers, was also professor at the royal academy at Copenhagen, and *hofbaumeister* in the royal service. He died at Copenhagen in 1759, aged 29 years. 69.

JAREB. A measure of land in India; see BIGAH.

JARMAN and GARMAN (EDWARD), properly JERMAN (E.) JARMORINI (GIU.), finished 1788 the church of S. Spirito at Bologna (begun in 1665); and restored the church of S. Sigismondo in the same city, built about 1730 by C. F. Dotti.

JARRAH. The native name of a timber tree, probably the EUCALYPTUS resinifera, or Red Gum tree, called mahogany in the colony of Western Australia or Swan River, to which locality it is believed to be peculiar. It must not therefore be confounded with other similar species not possessing its peculiar properties of being proof against the white ant and sea worm. "A piece of this wood taken from a vessel repaired in Swan river in 1830 exhibited no appearance of injury from marine worms, although other kinds of timber, in close proximity to it, had suffered severely. Sometimes the sap was pierced by the teredo and the ant to the depth of half an inch; but the red timber was never attacked by them, nor did it appear liable to decay from other ordinary causes. Jarrah timber had been used in Western Australia for all the ordinary building purposes, as well as for hydraulic works; colonial vessels built of it had traded among the islands of the Indian archipelago for many years without being coppered, and were only coppered to prevent the too rapid adhesion of marine plants. The tree frequently exceeds 150 ft. in height before dividing into branches. There were no knots or gum veins, but there was a tendency in growing to form a pipe up the heart, which renders it expedient, when selecting beams, to divide the tree down the middle, or to quarter it. The supply is said to be unlimited, and its price in 1850 in England was £12: 10 per load of 50 cubic ft., which would probably be reduced with a regular demand"; INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, 8vo., London, 1850, ix, 40-1; CORPS OF ROYAL ENGINEERS, *Papers*, etc., 8vo., Woolwich, 1864, new series, xiii, 67.

JAROSLAV. A town of Russia, founded in 1025, situated on the river Volga at the confluence of the Kotorosl, is the seat of an archbishop. The houses are mostly of wood, the streets very irregular, narrow, and only partially paved. It contains forty-four churches, all of stone, generally surmounted

by domes and spires. The other buildings deserving of notice are, the seminary or college, richly endowed by prince Demidoff, possessing good collections; a gymnasium, and several other public schools; three monasteries; a general and a foundling hospital; several poorhouses; and a house of correction. It is also the residence of a governor, and the seat of several important courts and public offices. 50.

JASPER. The jasper and quartz rocks found in great abundance and variety, in Siberia beyond the Ural, are well known for their extreme hardness. The former is a kind of pseudo jasper, or pseudo jaspic lava, of greenish colour, which resists almost every tool, and requires to be cut with emery. The Russian imperial manufactories are at Ekaterinburg in Perm, and at Kolyvan in Tomsk, Siberia; in both places the whole of the work is done by manual labour. A candelabrum of Kalkansh jasper, was priced at £2,285 in the Russian court of the 1862 Exhibition, having taken ten years to work; *BUILDER Journal*, xx, 924.

The Fr. *jaspe antique*; It. *diaspro*, is a breccia, of a greenish colour with transparent red spots; there is also a variety of black with small white spots or streaks, which is very rare. The spacious church at Andoain, near San Sebastian in Spain, is constructed chiefly of jasper. The remains of a pavement of jasper, cir. 1170, surrounds the communion table at Canterbury cathedral. A railway bridge was about to be constructed (1850) over the river at Sherbrooke in Canada, entirely of jasper, of which unbounded masses are obtained in the vicinity of that town. An immense quarry of jasper, 66 ft. in depth, has been opened (1865-6) near S. Gervais, in part of the Mont Blanc range. Some specimens are of a fine pure red colour, without veins, somewhat resembling *rosso antico*. The variety most prized, from the Siberian and Russian quarries, is of a green colour with red spots, and called "bloodstone". The above quarry will supply slabs, pillars, etc., cut and polished. M. Garnier has ordered twelve columns and forty medallions to be made of it, for the saloons in the new opera house at Paris.

There is at Belgiaræ, in the north of Italy, a very beautiful breccia, called by the masons of Milan *jaspro tenero*, much used there for ornamental purposes. There are eight large columns of it in the drawing-room of Oakley Park in Suffolk, which S. Smirke, R.A., had made at Milan, and sent to England in 1830.

JASSI or YASSI (ancient Jassiorum Municipium). The capital of Moldavia, situated on the river Baglin or Bachei a stream flowing into the Pruth, is the seat of a Greek archbishop. The fortifications were destroyed in 1788. It covers a large space, the houses, which are of timber, being generally provided with gardens. The streets are mostly narrow and winding, and badly paved with rough oak planks; the principal one is long and spacious, with some good houses built since the destructive fires of 1822 and 1827; the ecclesiastical buildings escaped, being of stone or brick. These structures are very numerous, having consisted of forty-three churches and chapels, and twenty-six convents; among them, are the cathedral dedicated to S. Nicolas, the churches of Sokolla, Tschetezuje, and Galata, the Roman Catholic church, the Lutheran church, etc. The formerly fortified convent of Trisweletch (or Tresphetitili, being dedicated to the three saints, Basil, John Chrysostom, and Gregory), is said by DEMIDOFF, *Voyage dans la Russie Méridionale*, fol., Paris, 1848, pl. 23, 24, to be the only church of stone; it was founded 1622 by the voyvode or hospodar Basil. Its surface is covered with very delicate foliage and sculptures in relief. It has three naves; the sanctuary is also richly covered with foliage; the interior has been gilt, but has suffered from being three times pillaged and burnt. The archiepiscopal palace, a large bazaar, baths, etc., are among the few other buildings of any note.

JASZCZOLD (ALBERT) of Poland, was born in 1763, and died in 1821. His works are not described by CIOPKO, *La Pologne Hist.*, etc., fol., Paris, 1836.

JAUM and JAWME, see JAWMER.

JAUNPORE, also written Jounpur and Juanpoor. A town of Hindostan, thirty-six or forty miles north-west of Benares, situated on the river Goomte, over which is a many arched bridge, considered one of the finest of those built by the Mahomedans in India; on each side of it are stalls serving as shops. The lofty fort of solid stone was erected about 1260. "The Jumma mesjid or Friday mosque was commenced by Shah Ibrahim 1419, but not completed till the reign of Hosein 1451-78. It consists of a courtyard 220 ft. by 214 ft., on the western side of which is situated a range of buildings, the central one covered by a dome 40 ft. in diameter, in front of which stands a gate pyramid or *propylon* of almost Egyptian mass and outline, rising to the height of 86 ft. (OLIPHANT, *Katmandu*, 8vo., Lond., 1852, makes it 120 ft. high by 70 ft. wide), covered with inscriptions and devices, and tapering in breadth and depth. Beyond is an apartment 40 ft. by 50 ft. covered by a bold pointed vault with ribs, and so constructed that its upper surface forms the external roof of the building, which in Gothic architecture is scarcely ever the case. The smallest of the mosques is the Lall Durwaza or Red Gate, in the same style as the others; with a similar *propylon*, exhibiting that strange admixture of Hindu and Mahomedan architecture which pervaded the style during the whole period of its continuance in India. The Atala mesjid is the most ornate and beautiful of the three remaining mosques, none of which have any minarets. The colonnades surrounding the court are four alleys in depth, and with its arrangement of pillars, caused baron Hugel to conclude that it was really an old Buddhist monastery, but the gateways are purely Saracenic; the western face of the court has three propylons, richer and more beautiful than that of the last named mosque, while its interior domes and roofs are superior to any other specimen of Mahomedan art of so early an age. These buildings possess a simplicity and grandeur not often met with in the style"; FERGUSON, *Handbook*, 8vo., London, 1855, i, 422-4, with two illustrations. KITTOE, *Indian Arch.*, fol., Calcutta, 1838, gives the Chehel Situn or palace of forty pillars; the old mesjid in the fort; the Barahiduri; the Jamai mesjid, and the Zinziri mesjid, all at Jaunpore; as well as the ruins of a mausoleum at Kutgurb near the town.

JAYANESE ARCHITECTURE, or those styles exhibited in the sacred buildings in the island of Java. It has already been observed *s.v.* **INDIAN ARCHITECTURE**, that some kind of Brahmanism was crushed in the western part of India by the Buddhist sovereign Salivahana about 76 or 78 A.D., and that its adherents seem to have fled from Guzerat to the southern side of Java, where, in 413 (there being then no Buddhists in the country), they were flourishing: their dominion does not seem to have extended into the western part of the island; and yet the two greatest and most ancient structures, the Buddhist temple at Borobudur and the Jain temple at Brambanan, occur in the district of Matarem, near the centre of the southern side. As these monuments have been sufficiently noticed in this Dictionary, it will be sufficient to endeavour to account for their presence in that locality, especially as the Jain structure seems to be four centuries earlier than the Buddhist work. It would appear that the struggle in the south of India between Brahmanism and Buddhism terminated in the persecution of the latter form of religion, and in the flight of its adherents in their turn to Java in the middle of the fifth and of the seventh and eighth centuries; probably again when the Sivite worship was restored 800-850 in the Deccan; and finally when the Brahmanical religion reacted upon the north of India during the tenth, eleventh, and twelfth centuries: on this last establishment, according to the opinion expressed by FERGUSON, *III. Handbook*, 8vo., London, 1855, pl. 56-60, the Buddhists superseded the Jain colonies founded in the ninth century, to which period he thinks that Brambanan may belong, although sometimes dated 1188-1218; while he will hardly ascribe an earlier date than the fourteenth century to the ruins at Boro-

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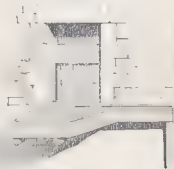
budur, although sometimes dated 1260: in both cases the buildings are transitional in character, *i.e.* Hindu, the influence of Brahmanical sculptors being visible, as would be naturally the case when they were the servants of the new comers. The Mahomedans expelled the Hindoo worship in the fifteenth century. CRAWFORD, *History*, 8vo., Edinburgh, 1820, i, 156-76, describes the native dwellings of Java, which are chiefly of timber construction; the religious buildings above named, of stone, are described, ii, 196-223. PFRIFFER, *Second Journey*, 8vo., London, 1855, notices that Mr. Wilsen had been commissioned by the Dutch government to make exact drawings of the interior and exterior of Borobudur, on which he had spent four years, having finished them in 1851-2. RAFFLES, *Java*, 4to., London, 1817.

JAWE PIECE. A term of ancient carpentry occurring with various orthography in contracts and descriptions, and the meaning of which is doubtful. "The Iawe peces and crestes were karued wyth vinettes and trailes of sauage worke, and richely gilted with gold and bise, thys woorke corbolyng bare the candelstykes of antyke woorke whiche bare little torchettes of white waxe", occur in the description of the banquetting house at Greenwich hall, 19 Henry VIII, in HALL, *Chronicle*, 4to., London, 1809, p. 722. "In the tower—a roffe of tymbre and a bourde made complete w^t a somer and joystes w^t joll pieces and plates";—"plates and joyll peces under the olde roffe"—"blocks—for leyng into the walls to nayle the joyll peces unto"—"new waynscot betweene the jowe peces"—"cutting of iij corbelles to make them lyke to the joyll peces"; as appears in description of work, *temp.* Henry VIII; BAYLEY, *Tower of London*, 4to., London, 1821-5. "Duorum facientium gowepecis dormitorii", 13 Edw. III, is found in the Ely Sacrist Rolls. 17.

JAWMER, JAUM, and JAWME. A stone for a JAMB; see CHAUMERE; JAMB MOLDING.

JAWSTONE and JAWHOLE.

In the south west of Scotland, the term is used for the kind of sink in old town houses, placed on the outside of windows, to receive slops from the pail, which are then conveyed to the ground by a pipe. To *jaw*, is to pour out. W. R. C.



JAYPOOR, and JEIPOOR, in India, see JEYPORE.

JEALOUS GLASS. A term given to a "waved glass", a species of obscured glass, named in the *Price Books* of 1735, and priced at 2s. 6d. per foot super. glazed.

JEAN (MAÎTRE), or Magister Johannes, in the thirteenth century, was employed upon the cathedral at Utrecht: AICARD, *Patria*, 8vo., Paris, 1847, p. 2148.

JEAN D'ACRE (SAINT) in Syria, see ACRE; and WIL-LIELMUS.

JEBEL BARKAL, or Gib el Barkal, in Egypt, see MOUNT BARKAL.

JECHT (. . .). A Saxon *baumeister* who practised in Russia, and constructed for the empress Anne the wooden palace called Annahof at Moscow; and for the empress Elizabeth, the winter palace at S. Petersburg. He died in 1763. 69.

JEDDING AXE. An axe or hammer used by masons to 'scabble' or bring the surface of a stone into shape. The flat end is used for knocking off the most protuberant angular parts, when less than right angles; the other end is pointed for reducing the surface to nearly the intended form. 1.

JEDDO in Japan, see YEDO or YEDDO.

JEDMILA or JEMILA, in Numidia, see GEMELLE.

JEIPOOR, in India, see JEYPORE.

JEM, JEMME, Jemmel or Jimmel, in Tunis; the modern name of THYSDRUM.

JEMEW, see JEWMEW.

JENINS (ROBERT) was one of "ye kinges iii Mr Masons" as

named in an "estimate of ye charge for ye makinge of a tombe for king H. 7," which was subsequently discarded. In 1499-1505 he received various payments as the mason employed on king Henry VII's works at Windsor; *Expenses of Henry VII*, Addit. MS. 7099.

JENNINGS (HENRY), master mason at S. George's chapel, Windsor, 1474, etc., 13 Edward IV, purchased for the works, stone at Tainton in Oxfordshire. He had a gown allowed him; POYNTER, *Essay*, to WYATVILLE, *Windsor Castle*, fol., London, 1841, p. 8; and TIGHE and DAVIS, *Windsor*, 8vo., London, 1858, i, 375.

JENNY SCAFFOLD, see FRENCH SCAFFOLD.

JENYNS (JOHN), chief mason at Windsor Castle, 21 Edward IV (1482) under Richard Beauchamp, bishop of Salisbury, had 66s. 8d. as a reward besides clothing, with £12 wages. The following year he had the same reward; LYSONS, *Berkshire*, 4to., London, 1813, i, pt. 2, p. 470.

JERASH or Djerash, in Syria, see GERASA.

JERKIN HEAD. A term defined by NICHOLSON, *Dict.*, as "the end of a roof that is not hipped down to the level of the adjoining walls, the gable being carried higher than the level of the said walls." The small hip shewn in the sketch is the jerkin head. The GLOSSARY giving this explanation, adds that in some counties it is called a 'shread head', as also stated by GWILT. *Encyc.*, Glossary, s. v. The term is described by NEVE, *Dict.*, as "a head being both gable and hip at the same end"; and s. v. Barge course, he uses the word 'kirkin head', apparently for the same portion of a gable. It is probably the same as 'a pirk to a gable', a term used in a Rutlandshire description.



JERMAN (EDWARD). After the fire of London 1666, he was directed by the committee for rebuilding the Royal Exchange, to report on the ruins; his report together with others by Hooke and Mills, was presented 23 October: on the 25 April 1667, "the committee being very sensible of the greate burthen of business lying upon him (Mr. Mills) for the city at this time; and considering that Mr. Jerman is the most able knowne artist (besides him) that the city now hath; therefore the committee unanimously made choice of Mr. Jerman to assist the committee in the agreeing for, ordering, and directing of that worke; and, having declared the same unto him, hee, after much reluctancy and unwillingness (objecting, it might bee thought an intrenchment upon Mr. Mills his right), at length accepted, being assured first, by the lord mayor and the committee, that itt was no intrenchment, and that this wholle committee, at all times, would acquit him from any scandall in that behalfe." On 9 December, "the committee considering that Mr. Jerman—hath not yet received any gratification for his paines about drawing drafts and directing the building; they therefore ordered that fifty pounds shall bee paid him upon account, until further consideration of his merites." The last mention of his name in the extracts is on 22 October 1668, and he died before 28 November, on which day Mr. Cartwright the mason "declared himselfe master of the wholle designe intended for that building"; and although Messrs. Samuel, Hooke, Oliver, Mills, Rotten, and Cibber, were put up to succeed Jerman, it appears that Cartwright went on with the work; and 26 March 1670 "presented to the committee a draft of the frontispiece to Cornhill and the cupilo, according as he advised to build it, of which they approved": Dr. Hooke and Sir C. Wren were occasionally consulted. Roger Jerman, the "young Mr. Jerman", did the carpenter's work, and John Tanner was the bricklayer; (*Extracts from Records of the City of London*, etc., 1564-1825, fol., London [1839]). This, the second Royal Exchange, is said

to have cost £58,962, and was destroyed by fire 10 January 1838. TITE, *Proceedings taken in Building the original Exchange*, etc., paper read at Inst. Brit. Arch., December 1845, and printed in *BUILDER Journal*, 1846, iv, 2, gives further detail of the erection of this building, and notices that two large drawings on vellum of Jerman's design, considered to be contemporary with the building, were at that time in the possession of R. W. Jupp, esq., of Carpenters' hall. PENNY CYCLOPEDIA, s. v. Royal Exchange. Illustrations of this building are given in CAMPBELL, *Vitruvius Britannicus*, fol., Lond., 1725, ii.

To Jerman is also attributed the design of the following buildings, erected after the fire: Merchant Tailors' hall, Threadneedle-street; the hall was 90 ft. long (two new galleries now make it 114 ft.) and 45 ft. wide; Fishmongers' hall, at the northern foot of London bridge (rebuilt 1831); Drapers' hall, Throgmorton-street (the street front ornamentations being added by R. Adam); and Haberdashers' hall, Staining-lane and Gresham-street West, considerably damaged by fire September 1864. This last work is likewise attributed to Sir C. Wren; and it is probable that in consequence of Jerman's early death, the other buildings may have been completed by the workpeople employed, as was the case with the Royal Exchange. It is not quite clear that Jerman was appointed one of the surveyors to the city, but he acted as surveyor to Gresham college.

JEROPKIN, a colonel in the Russian service, succeeded to Gressini, and conducted 1730 the construction of that part of the city of S. Petersburg called Wassili-Ostrow: he is also supposed to have designed the church dedicated to the Virgin at Kazan, finished in 1737. He died about 1748. 68. 69. 116.

JERUSALEM (Gr. *Cadytis*, *Hierusalem*, and *Solyma*; Lat. *Colonia Aelia Capitolina*; Arabic, *El-Khuds*, or the Holy City). The seat of the Hebrew kingdom, from the middle of the eighth year of the reign of David, *cir.* 1049 B.C.; and afterwards the capital of Palestine. It is bounded on the east by the valley of Jehosaphat or of the Kedron, on the south and west by the valley of Hinnom, and on the north by a high rocky ridge that is part of the plateau on which the city is situated. On the south is Mount Sion, the 'stronghold' of David, the upper *agora*, or upper city, now occupied by the Armenians and Jews: immediately north is the *acra* or lower city, at present the Mahometan quarter; this lower city was divided from that first named by a valley called Tyropoieon, and from Mount Moriah (now the Haram es Sherif, i. e. the noble sanctuary) by another valley that was filled up by the Asmonean rulers B.C. 167 to 47. The new city Bezetha, now called Haret Bab-el-Hitta, planned by Herod B.C. 40 to A.D. 3, is north of all these three portions, and is occupied by the Christians.

The general line of the various old walls, with the portions of the towers called Hippicus, Phasaelus, and Psephinus, that were constructed by Herod, as well as of the fortress Baris which he altered and called Antonia, are shown in the woodcut: a large tank near the present citadel is probably that which was called Amygdalon. These are all the antiquities within the walls; for little appears to have remained of the other works by Herod, or of the buildings that were erected under Aquila, who was left for that purpose by Hadrian at his visit A.D. 130. From medals it appears that a temple to Jupiter Capitolinus, situate on Mount Moriah, was extant in the time of Hadrian; another to Venus in that of Antoninus Pius, was erected by Hadrian over the sepulchre.

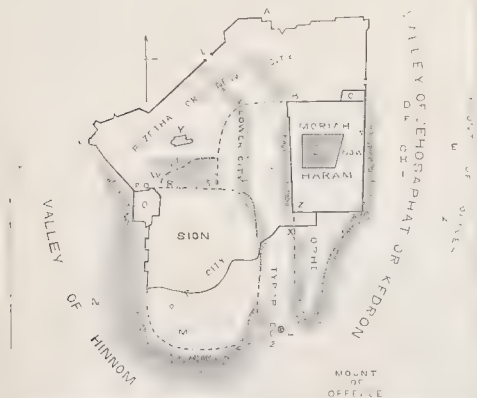
Outside the walls on the north are the remarkable and extensive excavations called the tombs of the Kings. CAIGNART DE SAULCY, *Voyage autour de la Mer Morte*, etc., 8vo., Paris, 1853, ii, 228-81 (8vo., London, 1853), endeavours to prove that the tombs of the early kings of Judah are here and not on Mount Sion; on this mount the traditionary site of the tombs of David and his successors is still guarded by the Mahometans; a tradition confirmed by the notices in Nehemiah, iii, 16-17, that these tombs were not far distant from the pool of Siloam.

On the east is a valley flanked by the Mount of Olives; in it occur the monolithic sepulchral monuments ascribed to Absalom and Zechariah, which exhibit a Greek treatment of Assyrian (commonly called Egyptian) art. In the side of the hill are two series of sepulchral chambers; one, close to the pillar of Absalom, called the tomb of Jehoshaphat; the other, between the monoliths, the cave of S. James. Still further south is the site called the tombs of the Prophets, being a gallery of sepulchral chambers arranged in a semicircle concentric with a circular funnel-shaped hall 24 ft. in diameter, with which it is connected by three passages. The plan is shown in E. G. SCHULTZ, *Jerusalem*, 8vo., Berlin, 1845: W. L. KRAFFT, *Die Topographie Jerusalem's*, 8vo., Bonn, 1846; T. TOBLER, *Golgotha*, 8vo., S. Gallen und Bern, 1851; *Die Siloahquelle und der Elberg*, 8vo., S. Gallen, 1852; *Denkblätter aus Jerusalem*, 8vo., S. Gallen und Konstanz, 1853; and *Beitrag zur medizinischen Topographie von Jerusalem*, 8vo., Berlin, 1855. To complete the list of antique remains, notice must be taken of the aqueduct attributed to the Roman procurator Pontius Pilatus A.D. 26-36, which crosses by nine low arches the valley of Hinnom.

The modern city is surrounded by a stone wall without a moat, built 1542: the four gates which here face the cardinal points, are N., Bab-el-Amoud, the gate of the column on the road to Damascus; E. Bab-es-Sabat or gate of the Tribes, also called Bab Sitti Miriam, S. Mary's gate, also called S. Stephen's gate; S., Bab-en-Nebi Daoud, the gate of the prophet David, or Sion gate, which does not now belong to any thoroughfare; and W., Bab-el-Hallil, the Bethlehem or Hebron gate, on the road to Jaffa. Four others are closed. At some distance west of Mount Moriah a considerable space is occupied by the church of the Holy Sepulchre with its appendages. The greater part of the rest of the new city, which leaves the tomb of David outside the wall, is occupied by imarets and medressehs in connection with the mosques, and by Christian monasteries; of which last, the Greek patriarchal monastery of S. Constantine, situated near the church of the Holy Sepulchre; the Latin convent, a large structure that usually receives European visitors; and that of S. James belonging to the Armenians, on

ings of the mission, were built upon Mount Sion from the drawings of the late M. Habershon, who visited Jerusalem in 1842, to arrange for their erection; *JOHNS, Illustrations*, fol., London, 1844.

The city recovered its name (Jerusalem) in the time of Constantine and his mother Helena, who erected 326-36 the basilica called the Martyrium of the Resurrection, close to the sepulchral cave which was enclosed in a court beyond the altar of the church. Their zeal was emulated 527-625 by Justinian, in the erection of several churches and hospitals, described by PROCOPIUS, *De Edif.*, v, 6. Much restoration must have followed the desolation caused 614 by the Persian sack of the city; and the churches of the Anastasis or Resurrection (including that of the Sepulchre), of the Calvary, and of S. Constantine, were almost rebuilt in a group by Modestus; the city must have been in good order when it was taken 634 by the khalif Omar. According to the tale succinctly told four hundred years later by EUTHYCHIUS, *Annales*, 4to., Oxford, 1658, ii, 284, that ruler accompanied the patriarch Sophronius to the church of the Resurrection, and thence to the church of S. Constantine, where he prayed upon one of the steps at the eastern door: he then asked for ground on which he could erect a mosque, and received a site having in the middle of it a rock which was the holy place of the Israelites: it is added by EUTHYCHIUS that when Helena, the mother of Constantine, had built churches at Jerusalem, the site of the rock and its neighbourhood had been laid waste and so left: and that Omar built his mosque so as to leave the rock outside (to the north) of that structure. It appears from the same author, that Abd-el-Malek Ibn Merwan 684-705 enlarged the mosque until he brought the rock within it: and that his successor Al-Waleed Ibn Abd-el-Malek 705-15 built the mosque, the rock being placed in the middle of the edifice, and surrounded it with a building overlaid with marble; also he pulled down and then put up over the rock the dome, made of copper and gilded, which had been on the church at Baalbec, that belonged to the Christians. The view held by FERGUSSON, *Anc. Topography of Jerusalem*, 8vo., London, 1847; and *Notes on the Site of the Holy Sepulchre at Jerusalem* (an answer to the EDINBURGH REVIEW, 1860, cxii, 423-37), 8vo., London, 1861, denies the preceding account, as he considers that the rock delivered to Omar was not in this place; that the mosque which Omar built still exists to the eastward of the mosque El-Aksa, and bears his name to this day; that the Aksa is the building, and the only one of Abd-el-Malek, in the year 688; that it stands on the very centre of the area of the Jewish temple; and is not the church of the Virgin built by Justinian (which he places to the east of it); that the octagonal Dome of the rock, or Kubbet-es-Sakharah, which stands nearly in the centre of Mount Moriah, is the church of the Holy Sepulchre built in the age of Constantine (with a dome replaced about 1566-73); that the group of four churches mentioned in the seventh and ninth centuries were completed by the church of Golgotha and the basilica of Constantine; that the last named edifice was destroyed 1010 by El Hakim; that the Golden Gate-way is a festal portal of the age of Constantine; that the present church of the Sepulchre in the old town belongs most undoubtedly, both in plan and detail, to the age of the Crusaders, 1099-1187; and consequently that the title of church of the Holy Sepulchre has been transferred at some time from one building to another. It is not surprising that such a statement should have been combated fiercely: the three chief pamphlets against the views of that author on these and other points are entitled *Collected Opinions upon Mr. Fergusson's Theory of the Holy Places of Jerusalem*, 8vo., London, 1864, with BONEY, *The Holy Places at Jerusalem*, 8vo., London, 1864, and WILLIAMS, *Dr. Pierotti and his Assailants*, 8vo., London, 1864: not one of these, any more than WILLIS, *Architectural History of the Church of the Holy Sepulchre*, 8vo., London, 1849, seems to have noticed that if the building at the eastern



1. Walls of the Temple. 2. Palace of Ant. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 851. 852. 853. 854. 855. 856. 857. 858. 859. 860. 861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875. 876. 877. 878. 879. 880. 881. 882. 883. 884. 885. 886. 887. 888. 889. 890. 891. 892. 893. 894. 895. 896. 897. 898. 899. 900. 901. 902. 903. 904. 905. 906. 907. 908. 909. 910. 911. 912. 913. 914. 915. 916. 917. 918. 919. 920. 921. 922. 923. 924. 925. 926. 927. 928. 929. 930. 931. 932. 933. 934. 935. 936. 937. 938. 939. 940. 941. 942. 943. 944. 945. 946. 947. 948. 949. 950. 951. 952. 953. 954. 955. 956. 957. 958. 959. 960. 961. 962. 963. 964. 965. 966. 967. 968. 969. 970. 971. 972. 973. 974. 975. 976. 977. 978. 979. 980. 981. 982. 983. 984. 985. 986. 987. 988. 989. 990. 991. 992. 993. 994. 995. 996. 997. 998. 999. 1000.

the highest part of Mount Sion, and capable of accommodating a thousand pilgrims; are the chief establishments. The Anglican cathedral dedicated to S. James, with the other build-

end of El-Aksa be not the mosque which Omar ordered, it must be the structure which his successors erected (in breach of a treaty) over the step of the church of S. Constantine where Omar prayed, close to the Holy Sepulchre, as supposed by FERGUSON; and that if this be not the case, then the anti-treaty mosque must have been close to the present church of the Holy Sepulchre, and must have disappeared at some time when the name could be transferred to the eastern end of El-Aksa.

SCHULZ, *Jerusalem*, 8vo., Berlin, 1845; ROBINSON, *Later Biblical Researches*, 8vo., London, 1856; G. WILLIAMS, *The Holy City*, 8vo., London, 1849, 2nd edit.; J. WILSON, *Lands of the Bible Visited*, etc., 8vo., Edinburgh, 1847; P. WOLFF, *Reise in das Gelobte Land,—neuen plan von Jerusalem*, 16mo., Stuttgart, 1849; THRUPE, *Ancient Jerusalem; a new Investigation*, etc., 8vo., Cambridge, 1855; VOGÜÉ, *Le Temple de Jerusalem*, fol., Paris, 1866; PIEROTTI, *Jerusalem Explored*, 4to., London, 1864. And further, the BUILDER *Journal*, 1865, pp. 185, 402, 462, 494, 507, 553, 567, and 773. A large plan of the city is given in FORBIN, *Voyage dans le Levant en 1817-8*, fol., Paris, 1819, and pl. 14-18, 25-38. ROBERTS and CROLY, *The Holy Land*, fol., London, 1842. ORIENTAL TRANSLATION FUND, *History of the Temple of Jerusalem*, from the Arabic of the Imam Jalal-addin al Siuti, by Rev. J. Reynolds, 8vo., London, 1836.

JESI (GIORGIO DI) of Como, rebuilt the cathedral at FERMO after the fire 21 September 1176, completed 1227.

JESSE (TREE OR). A common subject in mediæval illumination and in sculpture. VIOLETT LE DUC notes that it seems first to have come into vogue at the end of the twelfth century. It is represented as the winding trunk of a tree or vine, springing out of the patriarch Jesse, who is lying down, with figures denoting the genealogy of Christ as given in the Gospels, standing or sitting on the ends of its branches, and the Virgin and Child forming the fruit at the top. There is such a tree at Amiens, Laon, Rouen (in west front over centre door), and at many other places, carved either over a door or on the reredos of the altar. The most curious example is at Dorchester church, Oxfordshire, where the mullions and tracery of the chancel window on the north side, of four lights, *temp.* Edward III, take the form of five branches, on which the different figures are carved. It is illustrated in BRITTON, *Architectural Antiquities*, 4to., Lond., 1826, v; in ADDINGTON, *Dorchester Church*, 8vo., Oxford, 1845, p. 11; and SKELTON, *Oxfordshire*, fol., Oxford, 1823. At Christchurch, Hampshire, one is cut in stone in the reredos of the altar. The subject was likewise wrought into a branched candlestick, thence called a *jesse*, as recorded in a gift at Canterbury, 1097; a dorsal embroidered with this subject was given 1330 to Glastonbury abbey; and William of Wykeham bequeathed to his church of Winchester thirty copes of blue cloth embroidered with the history of Jesse in gold; TEST. VET., p. 768. A. A. 17. 19.

JESSE WINDOW. A stained glass window representing the subject as above. It is believed that no old examples are left in England; but one exists at Llanrhaidr yn Kinmerch, Denbighshire, with the date 1533; and another of sixteenth century work, brought from a church at Mechlin, has been put up, with additions, in 1841 in the church of S. George, Hanover-square, London. One is mentioned to have existed over the galilee at Durham. Portions of one, dating about 1240, in the central light of the northern triplet of the nave of Salisbury cathedral, are described by WINSTON, in *Proceedings of the Archeological Institute at Salisbury*, 8vo., London, 1851, p. 137-42. Such windows still remain, however, at S. Denis, Reims, Amiens, Bruges, and Beauvais, in France. A. A. 17.

JESUIT BUILDINGS. That branch of the Augustinian order called the Jesuits, which founded about 1360, obtained 1606 the title of Apostolical Clerks, and was suppressed 1668, employed in its monasteries, which chiefly consisted of cells detached from each other, like those of the Camaldolese hermits, some phase or other of the *style de la Renaissance*.

JESUIT BUILDINGS. The Institutio Clericorum Regulorum Societatis Jesu, founded 3 September 1539, by its missionary activity erected buildings in almost every part of the world then accessible. The Society was expelled 1759 from Portugal, 1764 from France, 1767 from Spain and Naples, and suppressed 1773 at Rome. The Jesuit buildings were usually in accordance with the prevailing style of the leading architects employed at the time, or of the architectural education of the members of the society; for many of their works in Europe, and almost all their buildings abroad, were designed by the missionaries. TELLEZ, *Historia—da Campanhia de Jesus em Portugal*, fol., Coimbra, 1660, ii, 109, relates "Finally, in the year 1566 they resolved on building a more capacious church, and one that might be able to receive the numbers that flocked to them. They at first laid the foundations with the design of making three naves, after the ancient ordinary use; but, in the following year, they determined on another and a better plan. They agreed that the church should consist of one nave only; and that it might be more airy, more light, and might afford better accommodation to the hearers, who would thus be enabled not only to listen to, but to see, the preacher. They next thought of the roof, and consulted several celebrated architects on its design. They finally resolved to make it of wood; because—the walls had not shoulders of sufficient strength to sustain the weight and thrust which a stone vaulting of that size would occasion (the span was 41 ft.). An architect sent by the Catholic king Philip the Prudent (Philip I of Portugal and II of Spain) designed the roof in a manner never before seen in Portugal, so that without having any piers which might serve for props, it is very secure, and seems to hang in the air"; as translated in the *ECCELOGIST Journal*, 1845, iv, 183.

Great error has been committed by some of the recent historians of modern art, who have not hesitated to apply the title "Jesuit style" to representations of decoration that are really in the *style Louis XV*; but the "Jesuit style" might be illustrated by decoration in a better as well as in a worse stage of the art as practised 1575-1775. For example, the Jesuitenkirche at Cologne is a large Flamboyant church profusely overlaid and adorned with marbles and carvings of classical character. Lavish gorgeousness of incongruous ornament is characteristic of churches belonging to this order; the Jesuits, unlike the old orders, seem rather to have cast a slight upon pure Christian art, and to have been contented with excessive profusion and sumptuousness of enrichment in the prevailing pseudo-classical styles of the day. The chiesa de' Gesuiti at Venice is as wonderfully rich as the churches of this order are generally; the whole interior is overlaid with verde antique and the most costly marbles; the plan is cruciform; WEBB, *Continental Ecclesiology*, 8vo., London, 1848, p. 48 and 287. If there be any peculiarity to justify the idea of a Jesuit style of architecture, the best examples for study would probably be the churches of S. Michael outside Steier, the deanery church at Leoben, the S. Loreto at Alt-Kinsberg, the church and calvary at Schemnitz, and the interior of the church at Klosterneuburg. STEINMETZ, *History of the Jesuits*, etc., 3 vols., 8vo., London, 1848. J. W. F.

The great peculiarity of the Jesuit church is, it has no long choir. Ignatius Loyola finding how the breviary offices occurring every three hours interfered with the working of his system of active exertion for every body, obtained a dispensation from the necessity of such services; the consequence is that the altar generally stands in an apse at the end, like those of the basilican churches. As the great object of the Jesuits is preaching, the naves are generally unusually wide for the aisles, which in fact contain a row of chapels against a wall and sufficient room for a passage. Most of these churches have movable galleries covered with cloth, which can be erected temporarily on great occasions.

A. A.

JET and JET D'EAU (It. *zampillo*; Port. *surtidor*; chorro de

fuentes; Sp. *cangno de agua*; Fr. *jet d'eau*; Ger. *springwasser*). The term given to the issue of water from an AJUTAGE, but more especially when it flows upwards as in a FOUNTAIN. The pipe is made to regulate the delivery of the water when it is intended that the flow shall be simply of a circular form; and if the shape of the stream is to be altered, recourse must be had to the appropriate jet, such as those called, the Barker's mill, the convolvulus, the prince of Wales's feather, and the dome; the jet in a basket with a ball; the jet with four, eight, or twelve holes, or the larger one having eighteen, twenty-four, or thirty-six holes.

In the case of a tube fixed to the orifice of a jet it must be remarked that water spouting upwards through an ajutage would ascend to the same height as that of its upper surface in the reservoir, were it not for the resistance of the air, the friction of the sides of the ajutage, and some little impediments to the motion of the water itself; on account of which, this height of the rise is always defective. It is found by experience, that if the direction of the ajutage be somewhat inclined, the water will rise higher than if it be truly upright. Where height is, as usual, more regarded than delivery, the converse of a statement generally made will be observed, viz., that a polished round hole, in a thin plate of metal at the top of the pipe by way of ajutage, will suffer the water to spout higher than when it is cylindrical or conical. Experience also shows that the size of the pipe of the ajutage should be enlarged at or near the surface of the water in the reservoir, and that the pipe should be much larger than the ajutage. Also that there is a certain length among the several diameters of the ajutages which will spout the greatest height possible; this must not exceed an inch and a quarter. Likewise the height of the spout must have a limit, 100 ft. being almost as much as it will bear. The celebrated jet at S. Cloud plays 100 ft. That called the "emperor fountain" at Chatsworth ascends to a height of 260 ft. That at Wilhemshöhe near Cassel is said to be 12 ins. diameter, and to play 190 ft. high. Those at the Crystal Palace at Sydenham vary from 5 to 250 ft. in height.

The following table gives the height to which water will rise in the air on being discharged through a small aperture as in fountains; OVERMAN, *Mechanics*, 8vo., Phil., 1861.

| | | | | | | |
|-------------------------|------|------|------|------|------|-----|
| Head of water, ft. ... | 37.7 | 37.2 | 27.8 | 26.1 | 13.1 | 5.8 |
| Height of jet, ft. | 34.0 | 33.7 | 25.8 | 2.3 | 1.7 | ... |

JETIMO. A mistake in the *Serie del Uomini*, for Ittino as the Italian form of ICRINUS.

JETTY (It. *molo*; Fr. *jettée*; Ger. *damm*). A construction carried out from the land into deep water to protect the mouth of a harbour; or to form a landing-place, or a shelter for vessels; or to direct the tidal scour. It may be closed or open, being composed either of solid masonry, or of open piles covered by a platform of open planks. Examples of the latter system are to be seen at Brighton and Margate; of the former at Ramsgate, Hull, Leith, etc.; and in those erected on the banks of the Orne, the lower part of the Loire, the Rhine, the Rhone, etc., to guide the course of the waters.

In these constructions great variety exists, according to the precise circumstances of each individual case. In open work jetties, intended only for landing-places in fine weather, the floor should be so formed as not to interfere with the flow and ebb of the tide, or with the movement of the beach under the influence of storms; this provision may be calculated to affect the floor of jetties erected at about 14 ft. above high-water mark. In this case the planking should be laid with intervals of about 1½ or 2 ins. between each board. An open jetty offers one advantage, viz., of not interfering with the progress of the tide-wave, or with the advance of the alluvions, and therefore such great care need not be taken in studying the relative positions of the axis to the line of the coast as is necessary in a more solid jetty. Piles of wrought iron are, therefore, now preferred for the points of support of jetties

that are simply intended to serve as landing stages. The position, the direction, and the form of these jetties, depend upon conditions varying in each case, viz., the prevailing winds, the currents, the progress of the waves, and of the alluvial matters moving along the shores, etc.; they are consequently little amenable to general rules.

The architect may often be consulted as to the mode of forming a jetty in a lake or in other large ornamental piece of water, in rivers, or in streams; and these require to be so formed as not to occasion the deposition of silt, or the erosion of the shore. Generally speaking the objects are obtained by the adoption of the open pier or pile system; but in other cases, requiring solid piers, the laws of running water must be taken into account. Thus, the construction of a closed jetty in a tidal stream is likely to occasion the silting up in the corners, and care must be taken to prevent the counter current formed immediately beyond the line of deflection of the main current, undermining the masonry of the jetty. This would not take place in a jetty formed in ordinarily still water, in which case the chief precaution to be taken is to make the platform of the landing stage sufficiently high above the water: on extraordinary occasions a height of 3 ft. above the water may be considered enough to guarantee safe landing. To resist waves, the lateral stiffness of the framing must be ensured, by a width corresponding to the effort usually calculated, thus giving a resisting force equal to about one ton on the inch superficial, supposing it to be exercised upon the vertical direction of the piles, these being in the proportions of fourteen times the diameter, in their unaided height. Elm, fir, oak, or beech, are generally employed for the erection of piles, though beech or fir is liable to decay between wind and water; iron, either cast or wrought, is occasionally used, with proper precautions against the oxidation of the metal; stone is seldom employed in jetties serving as landing stages in ornamental pieces of water. PIER.

Timber jetties at the ports of Ostend, Trouville, Dunkerque, and Calais, are shown in NOUVELLES ANNALES DE LA CONSTRUCTION, fol., Paris, 1858, iv, pl. 40. An ancient jetty on the banks of the Thames adjoining to the ancient palace of Westminster, at the east corner of the Speaker's old garden, was found in 1839 in excavating for the foundation of the new Houses of Parliament; drawings by VULLIAMY are given in the ARCHÆOLOGICAL JOURNAL, 8vo., London, 1849, vi, 71. It appears to have been the principal landing-place connected with the palace; and is seen in the map of London taken in 1563.

JETZELER (CHRISTOPH) was born 1734 at Schaffhausen. Having studied mathematics at Berlin under Euler, he travelled in France, Germany and England, and returning to his native place, was appointed architect to the town. In 1775 he became professor of mathematics at the gymnasium; published *Description du nouveau pont* (after it had appeared in ANDRÉ, *Briefve aus der Schweiz*, 4to., Zurich, 1776, with two engravings; GRUBENMANN); and *Plans d'une maison des orphelins*, which institution he founded and endowed with a sum of about twenty thousand francs, being the greater part of his fortune. He died in 1791.

JEWISH ARCHITECTURE, see HEBREW ARCHITECTURE.

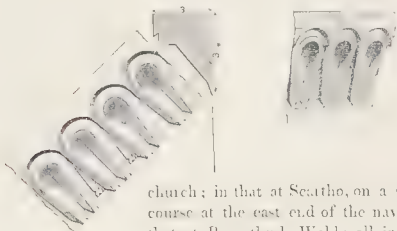
JEWMEW. The term used in 1657 as perhaps synonymous for a "H hinge". GARNET; GEMMEL; CHYMOL. GAGE, *Thingoe Hundred*, fol., London, 1838, p. 149, gives the use of the term in an extract from the accounts of Little Saxham hall, Suffolk, temp. 1 Henry VIII, thus, "a pair of jemews for my butry wyndowe, vjd." Also in 24th Henry VIII, "mending the leyves of the wyndowes sett on wt double jymewes vi leyves of them new made and dressyd"; BAYLEY, *Tower*, 4to., Lond., 1821-5, i, app. xxxiii.

JEWRY (Med. Lat. *judæa*, *judæaria*; Fr. *juiverie*, *la judée*; It. *giudecca*). That quarter of the town in which in

medieval times (and in some places, in the present day) the Jews had their habitations, and to which they were strictly confined. It was generally enclosed by gates which were shut by the authorities at certain hours. GHETTO. A. A.

In London, the "Old Jewry" was inhabited by Jews from the earliest times; their houses were pulled down to strengthen the city walls, by Simon de Montfort, temp. thirteenth century.

JEWS' HARP ORNAMENT. A characteristic ornament much in the shape of a Jew's harp, to be seen on the face of the doorway in the tower of S. John the Baptist church, Nettleton, near Caistor, as well as in the oldest parts of Stow



church; in that at Scartho, on a string course at the east end of the nave; in that at Barnetby-le-Wold; all in Lincolnshire; and on the impost of the bell-

fry window of S. Peter-at-Gowt's church at Lincoln: it is attributed to a late Saxon date by ATKINSON, *On Saxon Architecture*, in *Associated Societies, Reports and Papers*, 1859, p. 31. The cut exhibits the impost, etc., of the south transept window of S. Mary's church at Stow.

JEYPORE, JEYPOOR, JEIPOOR, or JEINUGGER. The principal city of Jeypoor or Ambér, in Rajpootana. Founded 1728 by Sowák Jey Sing (1699-1743), it eclipsed the former city of Ambér, with which the fortifications of the modern city unite, although the extremity of one is six miles from the other. It is entirely surrounded with a stone wall having lofty towers, and with seven gateways all alike. Except the town of Luchmangur'h, it is said to be the only place in India built upon a regular plan with streets at right angles; its design and execution is assigned to Vedyádhara, a Jain, a native of Bengal. The town is about two miles in length and one in width: the main street is forty yards wide, intersected by several streets of about forty yards in width, and at each point of intersection there is a *chauk* or market square. The cross streets are again intersected at right angles, and the latter by lanes. The houses in the principal streets are in general well built of stone. The palace, gardens, and royal premises occupy the whole of the central block, being half a mile long. The front of the residence is seven or eight stories high, flanked at each extremity by a lofty tower surmounted by a cupola. Within are several cloistered courts. There are numerous mosques and temples.

JACQUEMONT, *Voyage dans l'Inde*, 4to., Paris, 1835-44, part vi, p. 367, gives pl. 72 a section of the dépôts for furs, near the walls; and the elevation and section of a villa of the palace of the rajah, and states that there are within the palace grounds fully a dozen palaces communicating with each other by galleries or gardens. The *divani khas* or hall of audience is the most remarkable apartment, an oblong room built of white marble, which is also used for the palaces. There is also the arsenal; and the huge observatory, one of the many erected by the learned Jey Sing, is in good preservation. Ambér, now desolate, situated on the slope of a hill rising from the margin of the lake, possesses a "vast and gorgeous palace", massive and solid in construction, resembling the primæval ruins of Kashmir. JACQUEMONT and HEBER observe that they never viewed a scene so "striking, picturesque, and beautiful." Higher up the slope is the *zenana* crowned with four kiosks; and still higher up, and communicating with the palace by a succession of towers and gateways, is a huge gloomy castle with high towers, machicolated battlements, and loopholes, rendered more striking by one tall minaret rising above the

whole cluster. Besides serving for defence, it is used as a treasury and a state prison. THORNTON, *Gazetteer*, 8vo., Lond., 1858; TOD, *Rajasthan*, 4to., London, 1829, ii, 357, 367.

JHALRA-PATUN, or CHANDRABHAGA, and also called Chandravati and Gopalpore. A town situated on the river Chandrabhaga, to the east of Oodipore, in Northern Malwar, in India. This "city of bells" was raised by Dulleel khan, one of the most devoted servants of the regent of Kotah, Zalim Sing (born s. 1796, i.e. A.D. 1740, living in 1821). It is in shape nearly a square, surrounded by a substantial wall and bastions; the plan that of the Indian *chowpun* or cross, with two main streets intersecting each other at right angles, and many smaller ones parallel with them. The main street lies from north to south. At the intersection, stands upon a broad terrace the temple to Chatoorbhojja, the 'four armed' god, at least 90 ft. high. Thence to the northern gate extends a street nearly a mile long, having on either side a range of houses of uniform structure, having an appearance of comfort, and terminated by a temple to Dwarcanath; the image was ploughed up from the ancient city; it is a magnificent shrine on the banks of one of the finest lakes in India, the waters of which could be made to surround it at pleasure.

A temple dedicated to the sixteenth Jain prophet, is one of the hundred and eight temples of the old city; their sites mark the course of the river for a considerable distance; while the flights of steps or *ghats* have an immense number of figures of all kinds on each side of them. TOD, *Annals*, etc., 4to., London, 1829, gives ii, (554, 729), 732, engravings of the entrance to one of the two or three imperfect specimens remaining of a sanctuary or temple; four examples of sculptured foliage; two sculptured ceilings; three columns; and another entrance to a sanctuary; all these are from drawings by Ghassi, a native artist. Each shrine consists of a simple *mindra* or cell about 20 ft. square, with a portico and a long open colonaded vestibule in front: every one of the columns differs in detail from the others. The entrance is a mass of elaborate workmanship of great perfection. FERGUSSON, *Pictorial Illustrations*, fol., London, 1847, pl. 6, with a plan, gives the whole width as 31 ft., and the height of the pillars 9 ft. 10 ins.; and notices the details as unsurpassed in Hindostan. TOD gives, ii, 736, the date of s. 748, or A.D. 692, as the oldest one he found; and the next inscription in point of antiquity was from the Jain temple in the modern town, dated 3rd of Jeyt, s. 1103, A.D. 1047. This date of 692 is considered by FERGUSSON as about the period of the erection of these buildings, which he points out "how entirely dissimilar the columnar arrangement of this open porch is from the astylar forms used so universally in Orissa, and how similar the disposition of the columns here is to that found in many of the cave temples, as for instance No. 2 at Ajunta, where it is identical."—The age of the two buildings, though on totally different grounds, he "assigned to nearly the same period; and a comparison between the two would afford an interesting illustration of the difference between the architecture of the two religions about the beginning of the eighth century." He supposes the temple to have been originally Vishnite.

JIB. The horizontal arm attached to the upright post or stalk, and supported by the stay, spur, or strut, in the usual form of a crane for general purposes. But the introduction of iron as the material for the post of a crane has led to an important alteration of this definition; the structure of the machine has been varied by inclining the jib on the principle of a derrick: thus one end of the jib is brought down from the top to the bottom of the post (the strut is consequently abolished), and the top of the jib is connected with the top of the post by chains or by wrought iron tension bars. Thus the DERRICK is sometimes called a 'jib crane'.

JIB DOOR. A concealed door, generally made flush-framed, with its face level with that of the wall in which it is placed. There are considerable difficulties in hanging these

doors, and finding the lines for cutting the skirtings so that the door may open freely and yet the joints be unperceived. Very excellent methods for doing this are given in NICHOLSON, *Carpenter and Joiner's Guide*, 4to., London, 1805, p. 30. If the walls are painted, these doors are simply pumiced and painted as the rest of the work. If papered, this is done over all, and the joints cut with a sharp knife. The object of a 'jib door' is to preserve the symmetry of an apartment where only one door is wanted, nearer to one end than the other. Sometimes a real door and a false one can be substituted for a jib door. One method of hanging a jib door is thus described:

A, centre of hinge in the same plane as the dado and wall A B; D E, line of surbase molding; then make F G equal to F C; and draw G H perpendicular to F C, and it will be the true joint in which the surbase must be cut from the floor upwards; NICHOLSON, *Dictionary*, 4to., London, 1835, p. 169.

A. A.

JIBEL EL BARKAL, in Egypt, see MOUNT BARKAL.

JIMMEELAH, in Roman Africa, see GEMELLE.

JIMMER. A term for a hinge, still in use in Yorkshire.

JIMON or XIMON. From 1496 till his death in 1502 was *maestro mayor* at the cathedral at Seville; he was succeeded by A. Rodriguez. He is sometimes confounded with Ximon Perez, who 1522 submitted competition designs for the sacristies. MUELLER, p. 423, states that Jimon was *oberbaumeister* 1496 at the cathedral at Toledo, which is probably an error for Seville. 66. 116.

JOANELLO (. . .) flourished about 1570 in Spain. He made by order of king Philip II the designs for the greater part of the royal palace at Lisbon, and for the convent of S. Vicente. 5. 69.

JOANNES of Miletus assisted ISIDORUS of Miletus in the reconstruction 527-565 of the city of Zenobia, in Syria. 56.

JOANNES was commissioned A.D. 500 by king Theodoric, to repair the cloacæ at Rome, as reported to the prefect and senate: CASSIODORUS, *Variarum*, iii, 30, 31; GIBBON, *Decline*, etc., 8vo., London, 1854, iv, 268.

JOANNINA or IOANNINA, Janina, Jannina, and Yanina. The capital of the province of Albania, in Turkey in Europe. It is situated on the margin of a lake of several miles in extent, and though of modern origin, it does not possess, even among its sixteen mosques and seven or eight Greek churches, any building of importance. The citadel is placed on a square piece of land which forms a promontory in the lake. The good houses are on the west side of the town, each standing in its own garden; the English consulate is a very remarkable specimen of the best style of Turkish wood carving for domestic architecture. The cathedral is not remarkable, but it contains an iconostasis about 40 ft. long and 18 ft. high, of walnut wood with carved panels, and a pulpit of the same character. The churches of the seven monasteries in the island of Nisi, opposite the citadel, appear to be interesting from the frescoes with which they are decorated. The town is described by HUGHES, *Travels in Sicily, Albania*, etc., 4to., London, 1820, i, 437-86, and the greater part of vol. ii, with illustrations from drawings by C. R. Cockerell. STRANGFORD, *Eastern Shores of the Adriatic*, 8vo., London, 1864, p. 25-34.

The town is more noted (p. 486) for "the ruins of an old Epirotic city" (situate near the village of DRAMYSSUS, supposed to be the ancient oracular shrine of Dodona), "and distant about four hours' ride, affording one of the best and most perfect specimens of the ancient military architecture that we had hitherto beheld. It exhibits also the ruins of a theatre in a very high state of preservation, and the largest yet discovered in Greece." Careful measurements of it gave for the exterior diameter 430 ft., the width of the orchestra 130 ft., and depth

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73 ft. It has two *diazomata* or corridors, but the upper gallery, as in all other instances, no longer exists. Twelve radiating flights of steps lead from the orchestra to the higher circle, and the length of these radii, as near as we could measure it, is 150 ft. We counted very easily fifty-four rows of seats, but their state, caused by earthquakes, might allow of there being at least sixty;" HUGHES, who gives a plan of the walls, and describes the few remains of antiquity within them (p. 488). LEAKE, *Asia Minor*, 8vo., London, 1824, p. 322, notices that, like some other theatres, the extremities of the cavea are parallel to the scene; and that the excess of the cavea above the semicircle is formed by two right lines drawn from the extremities of the semicircle perpendicular to its diameter and to the direction of the scene.

JOBENT NAIL. A nail "commonly used (in the early part of the eighteenth century) to secure thin plates of iron to wood, and to nail on small hinges for cupboard doors, etc. The sizes are 2 and 3 lb. per thousand." The term is obsolete. 4.

JOCONDE (FRÈRE). The French name of GIOCONDO (FRA).

JOCTUS and JORTUS. The Latin name of A. BONZONE, commonly called Giotto.

JOUDPORE, in Hindostan, see JOUDPORE.

JOES, otherwise VANDENBOSSCHE (GILLES).

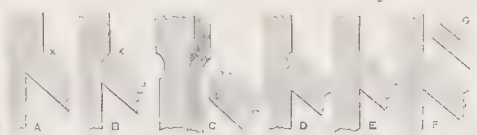
JOGGLE. The term given by masons to the indented joint by which two stones are united end to end or side to side for landings, balconies, etc. The joint is sometimes square as A, but more commonly angular

as B. The ends of the stones so jointed, are commonly

worked square, so that the joggle itself is not seen. The joint is generally flushed up with plaster or cement, and in good work it is run with lead. The projecting portion is called the 'He' or male, and the grooved or incised portion the 'She' or female, part of the joint. Sometimes through the idleness of workmen two female joggles are placed together as at c, and are then run or filled in with cement so that the defect cannot be seen; but from this imperfect construction accidents are likely to, and do often, occur. In carpentry and joinery, the joint at A is called a 'mortise and tenon'. DOWEL; TENON. A. A.

In wrought iron girder work, parts are said to be joggled where they are forged to fit as in girders: stiffeners or connections are made either by packing or joggling.

JOGGLE JOINT in Carpentry. The joint by which the braces in trussed partitions are connected with the main quarters, and the principal rafters with the king post, in a roof. In ordinary work the joint is made as at A, but that at B is considered a better form. A little play should be given at z, to allow for any settlements. For this purpose ROBISON, TREDGOLD, and Col. EMY, recommend a circular joint as at c.



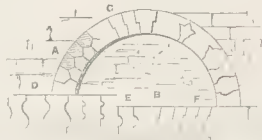
The latter author suggests that where the upright timber is not haunched as is generally the case in trussed partitions, the joint should be as at D. He also speaks well of those at E and F, of which last G is the section. These he calls 'English joints'. In France such joints are almost always pinned, as they were in mediæval work, but this finish is rarely now done in England.

A. A.

HODGKINSON, *Cast Iron*, 8vo., London, 1846, p. 332, has shown that for a fancied goodness of fitting, the strength is reduced from one half to two thirds.

JOGGLE JOINT, in Masonry (Fr. *clavau, croissette*). It is remarked by GIRAULT DE PRANGY, *Essai*, 8vo., Paris, 1841, that several constructions found in the East, and in countries that have experienced its influence, exhibit the employment

of different materials as voussours (A) for the sake of variety in colour, as at the church of S. Martin at Angers (of the ninth century), and several churches in Auvergne and in the south of France; in Sicily; in Calabria; in Apulia and other parts of Italy, especially at Salerno, Amalfi, Venice, Genoa, and Pisa; but above all in Egypt. But besides this mode of obtaining variety, architects in those countries have not only simulated by means of deeply engraved lines, but have actually executed, keystones and voussours whose joints or rather beds present contorted lines, or surfaces, as the case may be. No antique monuments of the best epoch of classic art are cited as examples of such a mode of construction; but it is seen in the extradossed voussours of a gate of the palace of Diocletian at Spalato (B), and in the so-called tomb of Theodoric at Ravenna (C). In France the same practice has been noticed by



VIOLETT LE DUC, *Dict.*, s. v. Appareil, as prevailing till the thirteenth century in several edifices in Poitou, Mayenne, and on the banks of the Loire: the same author illustrates that portion of his subject by an engraving of a portion of the arch of the western door of the church of S. Etienne at Nevers (A); and the lintel of the north door of the church of S. Etienne at Beauvais (B). The forms E and F are common in France but not so much so in England. Illustrations of this system are given in the plates in the works of the Italian and French writers on architecture. It is not found in Spain until the introduction of the architectural skill of the Mahometans, when it was perfected by the execution of new combinations of angles, and by the employment of peculiar, and often very complicated, forms. These several examples illustrate the general varieties of the joggle as they appear on the face of the work, the joints of the stones being worked to them; but it must not be forgotten that such work is a barbarism showing a want of confidence in the principle of the arch. A good selection of examples, including some of those above named, and others from Rochester cathedral, Tattershall castle, etc., in England, is given in BARTHOLOMEW, *Specifications*, etc., 8vo., London, 1846, 2nd edit. DOWEL; JOINT; TENON.

JOGGLE PIECE. The term given in the middle of the eighteenth century and earlier, to what was also called the CROWN POST, and now the king and queen posts. It is a post or tie having shoulders to receive the extremities of struts.

JOGLING. The term sometimes given in carpentry to the method of mortising and tenoning the head of a rafter or strut into the king or the queen post. The joggling is sometimes done without mortising, and the abutment often presents the appearance of the line in fig. A in woodcut, given s. v. JOGGLE JOINT, which should be made at right angles with the diagonal pieces wherever possible.

JOHANN, see COLOGNE; COLOGNE (. . . OF); GUMDEN; and JEAN.

JOHANN (PETER) of Lüchow finished 1519 the Marienkirche at Bernau. 92.

JOHANNES DE PADUA, see PADUA (JOHN OF).

JOHN (SAINT). A city and seaport of British North America, the capital of the province of New Brunswick, is situated on a rocky peninsula projecting into the harbour at the mouth of the river S. John. It was founded in the latter part of last century. The streets are regularly laid out and well built, but some are very steep. The buildings are principally of brick, but grey freestone and marble, both of good quality, have been brought into use of late years; many of the public structures present a good appearance, but none deserve special mention. The export of timber from S. John is considerable, principally consisting of bright spruce deals, planks and battens, 7, 9, and 11 ins. wide, by 3 ins. thick, up to 26 ft.

in length; they appear to be chiefly sent to the Liverpool and Dublin docks.

JOHN (SAINT). The capital of Antigua, one of the West Indian islands. It was first settled in 1632. The town, situated on the shore of a deep harbour, is about three-quarters of a mile in length, and half a mile in breadth. The houses are of stone, and well built. The first stone of the cathedral and parish church was laid 9 October 1845, and opened for service in Oct. 1847; in April it had cost £33,000, and another £10,000 was voted for it. It was designed by T. Fuller (son of — Fuller of Bath); and is built of stone exteriorly, with a timber framework left inside to guard against the effects of earthquakes; the latter is lined with pitch pine boards, leaving a foot between the wall and the boards. The inside dimensions to the boarding are as follows: length 157 ft. including the chancel; breadth 52 ft.; transepts, each 46 ft. wide and 27 ft. deep; height to the top of the cornice above the plate, 23 ft.; inside of the roof or ceiling, which is circular, from the floor to the top of the arch, about 33 ft. The two towers, at the west end, are 70 ft. high and finished with cupolas. The acoustic properties are said to be most excellent, probably arising from the wood lining; *BUILDER Journal*, 1851, ix, 334. It holds about 2,200 persons (1845, iii, 603). There are also six churches, as many chapels, and a number of other places of worship belonging to the Dissenters. The town is the residence of the governor of the Leeward islands. One of the most destructive hurricanes with which the town was ever visited occurred on 21 August 1848.

JOHN OF JERUSALEM (KNIGHTS OF THE HOSPITAL OF SAINT), commonly called Knights Hospitalers. One of the three great religious military orders. They observed the Augustinian rule, from their foundation A.D. 1048, at first proposing to entertain pilgrims, and to attend the sick and wounded. The military character of fighting against the infidels appears to have been authorized 1120; and about 1312, excepting in Spain and Portugal, they generally received the landed confiscated possessions of the Knights Templars; at that time they were known as Knights of Rhodes, from the place where they had fixed their head residence, and afterwards as Knights of Malta. On losing Jerusalem, the knights retired to Acre, which they defended in 1290; the king of Cyprus gave them Limasol in his dominions, where they remained until 1310; they next took Rhodes, and defended it until conquered by Solyman in 1522; they finally obtained Malta from king Charles V of Spain, which they strongly fortified. The order was suppressed in England 1540. In 1799 the emperor Paul of Russia declared himself their grand master; the island of Malta was taken from them by the French 1798, from whom it was taken 5 Sept. 1800 by the English, and confirmed to that nation in 1814.

A smaller establishment was called a COMMANDERY; and the Templar PRECEPTORY would also change its name with the owner. The commandery, built about 1380 at Chibburn near Warksworth, in Northumberland, "existing now almost as it was left by the Hospitalers", is an interesting instance; a plan and view are given in TURNER and PARKER, *Domestic Architecture*, 8vo., Oxford, 1853, ii, 197; but should be compared with the description read by WILSON, at a meeting of the Society of Antiquaries of Newcastle-upon-Tyne, 1860, given in *BUILDER Journal*, xviii, 187. Another example 1288-92 existed at Hogshaw in Buckinghamshire. The STATUTA HOSPITALIS IHERUSALEM, with upwards of 50 portraits and plates, fol., without place or date, is extremely rare. PANTALEO, *Militaris Ordinis Joh. Rhod. aut Melit. equitum rerum memorabilium*, fol., Basil, 1581; PORTER, *History of the Knights of Malta*, 8vo., London, 1858.

JOHN'S PATENT STUCCO PAINT CEMENT. A kind of oil cement superior to mastic; it will adhere to any substance, as wood, iron, and glass, and may be used in the winter. Its colour is similar to dark Bath stone, which it

closely resembles. Its manufacturers in 1845 stated that "it will effectually resist damp; not vegetate or turn green, or otherwise discolour; not crack, blister, or peel off: it never requires either to be painted or coloured; it will keep good and fresh in the cask in any climate for any number of years, and can be used with confidence at the sea-side; in the hottest or coldest climates at any season of the year; roofs may be laid or pointed with it; and any plasterer may apply it; it carries more sand than any other cement; and its first cost does not exceed that of the cheapest cement now in use." The cement is said not to deteriorate with age: it is packed in casks, and requires to be mixed with three parts of good, sharp, clean sand to make a stucco, which is applied in the same manner as any other. It will take a coat of its own paint in twenty-four hours.

The *patent stucco paint* appears to be very serviceable for painting over exterior brick walls, or when covered with Roman or other cements, binding itself with it, stopping the suction, rendering the wall proof against atmospheric effects, and producing a stone-like effect attained by no other paint; it finishes without a gloss, and gives out no deleterious exhalations or odour in drying: it requires no driers or turpentine.

This material is the same as that known as Mann and Co.'s patent stucco paint cement, which in 1844 was said to be extensively employed by engineers and conductors of public works, from its property of resisting the transmission of moisture in exposed and damp situations. It also adhered with great firmness to any smooth surface, and hence was well adapted to encase brick houses. The principal ingredients in its composition were said to be linseed oil, resin, and a sandstone of the oolite kind from Rouen. HUTCHINSON, *New Experiments on Building Materials*, 8vo., London, 1843, from 500 grains weight of it, deduced the following tabular comparison with other building materials.

| Name of Substance. | Absorption of Moisture by Weight. | Absorption of Moisture by Bulk. | Specific Gravity. |
|--------------------------|-----------------------------------|---------------------------------|-------------------|
| Asphalte | 5.00 | 12.86 | 2.572 |
| Carrara hard marble ... | 8.57 | 23.09 | 2.717 |
| Mann and Co.'s stucco .. | 16.00 | 35.56 | 2.223 |
| Ashbach flagstone | 20.50 | 50.77 | 2.477 |
| Oak | 224.75 | 128.04 | 0.5607 |

JOHN'S (SAINT). A town of British North America, the capital of the island and colony of Newfoundland. It consists chiefly of one street about a mile in length, rather irregularly built, but containing many good shops and stores, the former mostly of stone; the houses are chiefly of brick, with many of wood: it has much improved since the fire of 9 June 1846, when it was nearly entirely destroyed; ILLUSTRATED LONDON NEWS, ix, 3-4. It is lighted with gas, and well supplied with water. The cathedral of S. John was designed by G. G. Scott, R.A., of London; the nave (only) was in course of erection in June 1849; it was to be 106 ft. long, the tower 30 ft., and choir 60 ft., the former having six bays, the latter four; a view of its complete state is given in ILLUSTRATED LONDON NEWS, xiv, 429. A large portion of the stone was imported from Scotland. ECCLESIOLOGIST *Journal*, viii, 1848, pp. 274-9. There are nine other places of public worship; three Episcopalian; one Established Church of Scotland; one Free Church; one Methodist; one United Presbyterian; and two Roman Catholic, one of which, 100 ft. by 40 ft., was designed, in the Early English style, by J. J. McCarthy of Dublin, together with a convent for six nuns, and four schools, each 30 ft. square (BUILDER *Journal*, 1853, xi, 238). The Roman Catholic cathedral in 1858 had several stained glass windows, and paintings, inserted in it (xvi, 879).

Among the public buildings are, the government house, a large plain structure; the house of assembly, a handsome building of granite; the lunatic asylum; the hospital; the market (for which there was a competition in 1838, Messrs. Inman, Grellier, and Finden, obtaining the £50, £30, and £20

prizes; CIVIL ENGINEER *Journal*, i, 174), the upper story is used as a court room and custom house. Five schools in connection with the Church of England, Established Church of Scotland, and Roman Catholic; several societies; a mechanics' institute, with a museum, library, and reading room attached; a botanic garden; marine promenade; and three cemeteries. The gaol was designed about 1831 by Sir R. Smirke, R.A.

JOHNSON (JOEL). "Of his merit as an architect the church (of S. John the Baptist 1756) at Wapping, the Magdalen, the London hospital, the asylum, and many chapels and other edifices, public and private, are lasting monuments. He established and regulated the Walthamstow house of industry", which, together with other acts of benevolence, are recorded in the GENTLEMAN'S MAGAZINE, lxix, pt. i, p. 358, wherein it is stated he died at Dedham in Essex, 17 April 1799, aged 78 years. Joel Johnson, however, was only "the carpenter" employed at the London hospital under B. Mainwaring 1761-6: as the architects of the other buildings are not known, Joel may have designed them; and CRESY, in MILITIA, *Lives*, 8vo., London, 1826, p. 392, has mixed these works with those of John JOHNSON of Chelmsford.

JOHNSON (JOHN) designed the shire hall at Chelmsford in Essex, and "having completed it to the satisfaction of his employers, and at an expense less than the original estimate, was presented, in pursuance of a vote passed at the quarter sessions in 1792, with a silver cup of elegant form." The designs were published by him, *Essex County Hall*, fol., London, 1808; and also in a folio print engraved by T. Malton 30 Dec. 1794: the inquiry into the fall of the stairs is given in BUILDER *Journal*, 1856, xiv, p. 133, 151. He also designed the body of S. Mary church after its fall 17 January 1800 (two small views were etched by A. Pugin from drawings by C. Nattes; a large one by S. N. Summers was also published), and opened September 1803; the exterior was rebuilt in the old, and the interior in a modern, style: and 1787 the bridge of one arch. The county gaol, a spacious stone building, was commenced 1773 by — Hylyard, but was much improved by Johnson; BEAUTIES OF ENGLAND AND WALES, *Essex*, 8vo., London, 1803, p. 257-9, which gives a view of the shire hall; and an elevation of it is also given in STIEGLITZ, *Plans et Dessins*, etc., fol., London, 1800, pl. 79. He erected 1781-6 Bradwell lodge, or the rectory house at Bradwell in Essex, for the Rev. Sir Henry Bate Dudley, bart.; on the summit is an observatory with Ionic columns which serve as the chimneys of the house: it also served as a sea mark. W. P.

JOHNSON (JOHN) of Leicester, and founder of the Con-sanguinitarium in that town, designed about 1802 Whatton house, Leicestershire, for Edward Dawson, esq.; view in NEALE, *Seats*, iii, 2nd ser.; and Carlton hall, Northamptonshire, for Sir John Palmer, except a few rooms in the north wing of subsequent (1823) erection; it is a plain building, as shown in NEALE, *Seats*, iii.

JOHNSON (....) "late (1831) of Berners-street, built 1793-4 the small-pox hospital at King's Cross (removed for the Great Northern railway station); and built the barracks in Hyde Park, and other parts of the kingdom"; ELMES, *Topog.* This is probably the "J. Johnson, archt." whose name is to a drawing, of "a design (plan and elevation) for barracks to contain 2,500 men and officers, drawn by Rd. Elsam, June 1795", in the king's collection at the British Museum, wherein it is placed under the heading "S. James's Park".

JOHNSON (THOMAS), 'archt.' of Worcester, was 1789 the builder of the new west window of the cathedral, and 1792 the new east window. He died in 1809. He has been accused of cutting away much of the beautiful enrichment of the tower, and also of "beautifying" it; CHAMBERS, *Biog. Notices*, 8vo., Worcester, 1820, p. 469.

JOHNSON (THOMAS), also an architect, died in 1786 at Sibbury, near Worcester; CHAMBERS, *Biog. Notices*, 8vo., Worcester, 1820, p. 469.

JOHNSON (THOMAS) was born 24 December 1794 at Stone in Staffordshire, and displaying great talent for drawing, was articled at the age of thirteen to Joseph Potter of Lichfield; thence he went into the office of J. Shaw, sen., of London; and eventually established himself at Lichfield in 1825. Amongst his earliest works were the churches of Longton and Stoke in the Staffordshire Potteries; and the club house at Manchester. His chief works in Lichfield comprise Christ church; the restoration of S. Michael's church; the corn exchange and market hall; the grammar school; the probate court; the railway bridge; and S. Michael's parsonage. Among his other numerous churches are those of Uttoxeter, Gretes Green, Bilston, Darlaston, and Wyrley, all in Staffordshire.

The following mansions were designed by him:—Norcliffe, Cheshire, for Robert Hyde Gregs, esq.; The Park, at Manchester, for Robert Philips, esq.; Cressbrook, Derbyshire, for Henry McConel, esq.; 1836-8, Mere hall, near Knutsford, Cheshire, for P. Langford Brooke, esq. (two views are given in *Twycross, Mansions*, etc., 4to., London, 1847-50, ii, 67); and 1838-40 Heath house, Staffordshire, for John Burton Philips, esq.; the two latter being important structures in the Elizabethan style of architecture. The last church designed 1857-8 by him was S. Philip's, Kensington, for his son-in-law the Rev. Joseph Dickson Claxton. The parsonages and schools erected from his designs were very numerous; and his last work was the building for the parochial schools at Whittington, near Lichfield. Excepting the earliest productions, Johnson's ecclesiastical designs were chiefly in the Early English, and Decorated, styles of Gothic architecture. He died 7 May 1865, and was buried at S. Michael's, Lichfield. His eldest son was educated for the profession, but now resides in Portugal. James Trubshaw, at present government architect at Bombay, studied under Johnson, with many others. J. D. C.

JOHNSTON (CORNELIUS), 'painter and architect', published 15 January 1754 a very creditable "design for a British Museum" to contain in a quadrangular building the Cottonian library with the royal and antiquarian societies, and a royal academy of painting, sculpture, and architecture, which had not then been established. A print of the elevation exists in the king's collection at the British Museum.

JOHNSTON (FRANCIS) not Johnstone, or Johnson as sometimes written, R.H.A. of Dublin, or of Armagh, in Ireland, in which latter city he was resident from 1786 to 1793 (or only resident upon the works), superintending the erection of the tower to the cathedral. He then appears to have visited Dublin, where 1793-7 March 1807 he continued, on the design of J. Hartwell, the rebuilding of the upper portion in a Gothic style, of S. Andrew's church, including a tower 230 ft. high, of which two stories only were built; it was burnt in 1860. In 1794-1802 he designed the church of S. George (Italian style), one of his best productions: rebuilt, in a circular form, the house of commons which had been destroyed by fire 27 Feb. 1792: designed 1804 (H. A. BAKER and T. H. GOOD) the cash office of the bank of Ireland, 70 ft. by 53 ft., the walls are paneled with Bath stone with Portland stone columns: 1810 the infirmary of the foundling hospital, James-street (lately known as the North Dublin union workhouse): and 1816 the chapel, of Gothic architecture: 1812-20 the Richmond general penitentiary and house of correction in Grange Gorman-lane for 400 persons: 1807-14 the castle chapel in the Decorated period of Gothic architecture; the well executed external sculpture is by the Smiths, and the interior by Stewart: 1813 the alterations in the Bermingham tower of Dublin castle for the records (plans and section given in *RECORD COMMISSION, Reports*, fol., London, 1810-15, pl. xx), which also gives his design 1813 for a registry, record offices, etc., at the King's Inns: 12 August 1815-17 the post office, executed in granite with a Portland stone portico of six Ionic columns: cir. 1816 the addition of the Ionic portico to the south front of the viceregal lodge in the Phoenix park, for Lord Whitworth: cir.

1816 the wings and other additions to the Hibernian school, including the dining-hall and infirmary: and cir. 1818 the entrance gate, in a Gothic style, to the royal hospital of Kilmalmainham.

He laid 29 April 1824 the first stone of the edifice destined for the royal Hibernian academy of painting, sculpture, and architecture, incorporated 1813, of which institution he was mainly the founder, and was president for many years. It was erected at his own expense; and a lease renewable for ever at the nominal rent of five shillings per annum, was granted to the academy by Johnston on the 7 March 1826. The chief exhibition room is 50 ft. by 37 ft., the walls 23 ft. high, are lighted after the manner of president West's exhibition room; the council chamber is 30 ft. by 21 ft. 9 ins., and 16 ft. high; the entrance hall 20 ft. by 16 ft., and 13 ft. high; there are also keeper's apartments, etc. Any structures which he may have designed in the interior parts of Ireland, have not been ascertained, though he held for many years the office of "architect and inspector of civil buildings" to the Board of Works in Ireland (he was so in 1809 and 1819) at a salary of £240 per annum. He died 14th March 1829 in the 69th year of his age, and was buried on the north side of S. George's burial-ground. No other satisfactory memoir exists of this eminent Irish architect, one of the earliest practitioners of the mediæval style, than the few details compiled for the *DUBLIN BUILDER Journal*, 1859, i, 131-2, by W. Papworth, and 1860, ii, 195. There is an engraved portrait of him after T. C. Thompson, R.H.A. WALSH, etc., *History of Dublin*, 4to., London, 1818, describes and illustrates many of his buildings, i, 473, 515, 533, 570, 585-6, 606, 629, 667, and 1310.

JOHNSTON (RICHARD) designed 1785 the assembly rooms adjoining the rotunda in the gardens of the Lying-in hospital, in Dublin, and the rotunda itself improved externally, "assisted by F. Trench, esq., to whose exertions and taste these buildings are much indebted." MULVANY, *Life of Gandon*, 8vo., Dublin, 1846, p. 93, speaks very highly of him. He is supposed to be the father of Francis Johnston previously noticed, although BELL, *Gothic Arch.*, 8vo., Dublin, 1828, p. 117, states that Francis was a native of Armagh.

JOINER (It. *legnaiuolo*, *falegname*; Sp. *legnaiuolo*, *ensemblador*; Fr. *menuisier*; Ger. *tischler*, *schreiner*). The worker in wood who prepares the wrought work used in finishing a building, as floors, doors, sashes, stairs, etc. The term is employed in contradistinction to that of CARPENTER, the business of the latter being to execute the carcass; but the two trades are often confused together, except that the 'hedge carpenter' still remains.

In Scotland the joiner and carpenter are both called a 'wright', more especially the former, the latter having usually the word 'house' prefixed.

The term joiner is found in the name "Jacob Junctor" in the Fabric Roll of Westminster Abbey, dated 1253, 37th Henry III, for supplying tables (*BUILDER Journal*, xviii, 655); and probably in "William Joymer" who served the office of sheriff of London 1222, and that of mayor 1239, who was directed to cover the mattresses for Henry III with silk, velvet, and other costly materials, proving the joiner's trade to have been more what we now call the 'upholsterer,' TURNER, *Dom. Arch.*, 8vo., London, 1851, i, 100. 1419, *Stipendia Carpenteriorum*—Johanni Grene, joyner, pro joynacione tabularum pro libraria et planacione et groping de waynscott, per annum, 17s. 8d.; as in SURTEES SOCIETY, *Rolls of York*, 8vo., London, 1859, p. 39. The "office of our joynership within our Tower of our cite of London", is recorded in the *Rolls of Parliament*, 4 Edward 15, 1464. In 1571 "William Fawkoner, master of the Carpentry and Joynery work," built Old Cholmondeley house, Cheshire, as stated in an inscription over the hall door; TWYCCROSS, *Mansions*, 4to., London, 1850, iv, 19. Among the foreign protestants in 1618 as many as eleven 'joyners' are recorded as living in the parish of S.

Olave's Southwark, and liberty of the Clink, several being from the duchy of Cleve, and other parts of Holland; while only one carpenter is named; COOPER, *For. Prot.*, 4to., Westminster, 1862, p. 93-7.

The London Company of Joiners, also called "Joyners and Seelers" is of ancient standing, taking its descent from a fraternity which existed under the name as early as the reign of Edward III, but was not incorporated until 13th Elizabeth (1570). It was named the thirty-seventh in the list of the Companies in 1501-2, having then only fourteen members. "A reporte made" 19 March 1621-2 "by the Maister and Wardens of the Company of Joyners, Ceelers and Carvers wth in the City of London, of all the strangers borne—which doe use the arte or mistery of joyninge, ceelinge and carvinge—by whome the said Corporacion doe receive greate detrimente," is given in COOPER, *For. Protest.*, 8vo. Westm., 1862, printed for the Camden Society, amounting to the number of fifty. The companies of joiners and carpenters were often disagreeing. For instance, in "the answer to the Joyners petition pferred 9^o July 1672 to the Court of Aldermen against the Carpenters & to y^e Order therevpon then made." The Company of Carpenters answer—"that the original Charter of the Company of Joyners—makes no mencōn—what is their worke or what is not the worke of the Carpenters—The Statute of 5^o Eliz.—makes no mencōn at all nor speaks a tittle of a Joyner as it doth expressly of the Carpenter Turner Sawyer & other Trades and arts whereby it may be inferred that the employ^{mt} of y^e Joyner is included in the Carpenters Trade & is a part of the Carpenters worke and mistery & so hath bene promiscuously vsed & still in the country both callings are frequently done vsed & practiced by one person: And without question the Joyners Trade before their incorporacōn was chiefly to make & sell joyned ware as bedsteds tables chaires stools &c. & to joyne & ceele only & not to doe any other worke about building of houses but what the Carpenters employed them in (wch they did for expedicōn only) themselves generally doinge those workes they employed them in;" JEFF, *Carpenters Company*, 8vo., London, 1848, pp. 305-6.

The term "general joiner" is now applied to those labour saving machines lately introduced, which by the force of a two-horse power will perform the work of at least fifteen skilled joiners, in sawing, crosscutting, squaring, planing, and thick-nessing, mortising, tenoning, grooving, tongueing, rebating, boring, beading, molding, chamfering, etc. Small machines are worked by a treadle and require two pair of hands to attend to it.

JOINERS' TOOLS. These may be divided into shop tools or implements, and personal tools. The shop tools include, the *bench*, the *cramp* for holding glued joints, the *flooring cramp*, the *grindstone*, the *tool box*, the *measuring rod*, the large *glue pot*, with many others. Personal tools are as follows:—Driving tools; the *screwdriver* of various sizes, the *punch*, *spanners* for coach screws, etc., the light and a heavy *hammer*, the *clawed hammer*, the large and small *mallet*. Boring tools; the *gimlet*, the *bradawl*, and the *awl* or *fork* for needle points. Cutting tools; the *chisel* of various sorts, the *gouge*, the *centre bit*, the *brace and bits*, the *saw* of various sorts. Smoothing and slotting tools; the *jack plane* of various sorts, sometimes amounting to upwards of a hundred; the *plough*, the *spokeshave*, the *shaving knife*, the *old woman's tooth*; the *rasp* of various sorts, the *smooth rimer*, *glass paper*, *sand paper* and *cloth*. Drawing tools; the *pincers*, and the *claw* of the hammer, and (not properly) the *plyers*. Marking or gauging tools; the *philister* or *fillister*, the *gauge*, the *chalk line*, the *rule* and *chalk*, the *compasses*, the *callipers*, the *bevel*, the *square*, the *carpenter's level*, or square level, or **T** level, the *spirit level*, the *plumb bob* and *line*, the *mitra box*, the *cylinder*, the *rule*; and General implements; the small *glue pot*, the box for *needle points*, the *grease box*, the *oil can*, the *file*

for saw teeth, the *hone* and the *whetstone*, the *tool basket*, and sometimes the *nail box*—with perhaps many others. G. A.

It is said that no joiner can get admission into the shops of first-rate firms, unless his tools are worth, at least, £40. MONTFAUCON, *Antiquité Expliquée*, fol., Paris, 1719, iii, b, 5, c. 1, pl. 187, has given examples of the tools (from GRUTER) as used by the Roman *intestinaris*.

JOINERY (Lat. *intestinum opus*; Ital. *legname* (carpentry is *grosso legname*, or *legname stesso*); Sp. *ensambladura*; Fr. *menuiserie*; Germ. *schreinerarbeit*; *tischlerhandwerk*). The joinery of mediæval times is little known, scarcely anything being left of it except the doors, screens, pulpits, and seats of churches. The material used for these seems to have been oak. The floor-boards (sometimes of elm) are in wide pieces, the plain doors are rude and rough; in fact, were it not for the art of the carver there would be little to admire in mediæval joinery. The progress of the art appears to have been much accelerated by the introduction of a lighter style of construction; the importation of the fir of the north of Europe, a much easier wood to work than oak, walnut, or elm; and the general use of nails and glue. The great changes, however, were the invention of sash windows, the introduction of grounds and rebated jambs to doors, and above all the geometrical staircases. It is curious that in Moxon, *Mechanical Exercises*, 8vo., London, 1677, sash windows are not even mentioned, though it is known they existed before that date. Of course greater skill was then required than in any other precedent work required from the joiner. The abandonment of the stone mullion with its saddle-bars and stanchions led to the general employment of the wooden shutter, which from the early simple ledged flap was developed into moulded fronts, back flaps, grounds, and all the paraphernalia of splayed backs, elbows, and soffites. SHUTTER.

As in most things the French seem to have been in advance in the knowledge of joinery, for in the work of BLONDEL, *Distribution des Maisons de Plaisance*, etc., 4to., Paris, 1737, drawings for doors and shutters are given, the manner of framing and hanging them, as well as the construction of wainscoting, etc.; at present, however, there is greater perfection in the joinery of the English than in that of the French. In Germany, and on the continent generally, it is very rude. The chief difficulty, and in all probability the great impetus to advancement in the art, was the continued handrail, and considerable skill in geometry was required to find the lines by which it was got out. The first attempt to elucidate the method of finding the lines is said to have been made by HALF-PENNY in the *Art of Sound Building*, 4to., London, 1725. This was followed by PRICE, *British Carpenter*, 4to., London, 1733, who came much nearer the truth; by FREZIER, *Coupe des Pierres et des Bois*, 4to., Strasburg, 1737-39; and later by the well-known and important work of RONDELET, *L'Art de Batir*, fol., Paris, 1805-10.

The best impetus to the art of the joiner was, however, given by a self-taught working man, but who was well grounded in practical mathematics, Peter NICHOLSON; he published *Carpenter's Guide*, 4to., London, 1793; and *Carpenter's and Joiner's Assistant*, 4to., London, 1815. Since then the art has progressed to its present state. Other works are given, s.v. HANDRAIL, except NEWLANDS, *Carpenter and Joiner's Assistant*; *Materials, Principles of Framing, with applications in Carpentry, Joinery, and Hand Railing*, fol., Liverpool, 1860; GALPIN, *The Joiner's Own Book*, etc., showing the improvements since the days of Nicholson, 4to., London, 1856; TARBURCK, *Encyclopædia of Practical Carpentry and Joinery*, etc., 4to., London, n. d.; SILLOWAY, *Text Book of Modern Carpentry* (of America), Boston, 1858. 1. 14.

For the divisions of the art reference must be made to FLOOR, LINING, SKIRTING, DADO, BEAD, FILLET, SLIP, etc.: STAIRCASE, STRING, CURTAIL, HANDRAIL, BALLUSTER, NEWEL, SCROLL; HOUSING, RAMP, RAKE, WREATH; PARTITION, SHUT-

TER, SOFFITE, GROUND, ARCHITRAVE, JAMB, DOOR, SASH, SASH-FRAME, VENETIAN WINDOW, SHOP FRONT, SKYLIGHT, BOLT, HINGE, LOCK, LATCH, SASH-FASTENING, etc. A. A.

JOINT. (Gr. *ἄψυς* (?); Lat. *junctura*, *compage*, *commissura*; It. *commettitura* as applied to joinery, *convento* to masonry; Fr. *assemblage*, and *commissure*; Germ. *verbindung*, and *fuge*). The term given to the space, occupied by a substance such as glue and cement, between two pieces of brick, stone, timber, or other material, these being generally united permanently, though in some cases, as in **HINGING**, the *joint* is moveable. **RULE-JOINT.** Technically, the term has come to signify also the unoccupied space between two substances.

In the bricklayer's trade, the joints are fully described under **BRICKWORK**, **BEDS** and **JOINTS** (p. 147). The latter term is used for the vertical junction. **POINTING.**

In masonry, the joint (a term chiefly reserved for an upright junction) is rough tooled, fine tooled, or rubbed. **DRAUGHT**; **HARMUS**; **PLAIN-WORK**; **BACK-JOINT**; **ASHLAR**; **BED**; **CHANNEL**; **RUSTIC** when molded; **CRAMP**; **DOVETAIL**; **DOWEL**; **DRUM**; **JOGGLE**; **FRUSTRUM**; **GROINING**.

S. SMIRKE, in WEALE, *Quarterly Papers on Architecture*, 4to., London, 1845, notices, p. 5, that in the six old clusters of pillars of the round portion of the Temple church, erected *cir.* 1185, "very little pains had been taken to work close bedding joints; the two surfaces were very roughly tooled over, but an uniform bearing was secured by running in, in a fluid state, a great quantity of lead to the thickness, in some places of half an inch. A number of wedges were found in these beds, which appeared to have been used to bring the stones to a true level previously to the running of the lead. Some of these wedges were 3 ins. long, and were of lead, iron, and even of wood; the latter had, of course, nearly perished. The insertion and permanent use of these wedges prove that the visible joints must have been very imperfectly fitted, for some of the wedges were half an inch thick at their larger end." **DRUM**; **FRUSTRUM**.

Tracery work in mediæval architecture was well jointed, the lines radiating to the centres from which the arch or circle was struck, so that in case of decay, a single stone can be cut out and a new one inserted without endangering any other part of the tracery stones.

In carpentry, for the joints in general work, etc., see **TIMBER BUILDING**; **LOG HUT**. For connecting timber in lengths, **FISHED BEAM**; **HALVING**; **SCARFING**. For the like in thickness, **BENT TIMBER**; **DOVE**; **RIB**. For framing, **BUTT JOINT**; **CAULKING**; **DOVETAIL**; **HALVING**; **JOGGLE**; **LAP**; **MORTISE**; **SEW NAILING**; **STUBBING**; **SHOULDER**; **TENON**; **PIN**.

In joining, when sideways, **SHOT JOINT**; **GLUE**; **GLUEING UP**; **GLUEING UP IN THICKNESS**; **MATCHED BOARD**; **PLOUGHED AND TONGUED**. When endways, **FOLDING AND HEADING JOINT**; **HANDRAIL**. When crossways, **GROOVE**; **HOUSING**; **REBATE**. When framed angles, **MITRE**; **HOUSING**. When hingeing, **REBATE**; **RULE JOINT**; **RADIUS JOINT**; **JIB DOOR**.

In plumbers, zinc working, etc., for joints to lead pipe, see **SOLDERING**; **TARP**. To iron pipes, **FLANGE**; **SOCKET**; **WASHER** and **WASTE**; **UNION**; **SPIGOT** and **FAUCET**.

In plastering, the only jointing is that on cement and stucco work to imitate joints of masonry.

In slating, the joints of cisterns are simple grooves filled up with red cement. In slab slate roofing, the rebates are covered with small half-rounds also cemented and occasionally screwed down. The heading joints of slate ridges should also enter each other and be cemented: a tongue of copper is sometimes introduced.

JOINTER. A tool used to strike the mortar in beds and joints of brickwork. Its use and form are described *s.v.* **BRICKWORK**, p. 147.

In joinery, it is the longest plane used by a joiner; intended for joints of the greatest accuracy. **BENCH PLANE**.

JOINT HOOK, see **BEVEL**.

JOINTING RULE. A rule used by bricklayers for securing a straight face to their work. 1. 2.

JOINTING STONEWORK. A term which is synonymous with "tuck and pat" work in brickwork, but usually applied to rubble work only: it means bringing up the mortar joints to a full body above the surface of the stone to give the effect of squared work. This is now usually considered very bad workmanship, the mortar being directed to be left within the face of the stonework. The distinction of the three methods employed in early mediæval work, being this projecting and overlapping system; that of lesser width of joints without the overlapping mortar; and the finer jointed work yet with mortar overlapping, as usual in buildings of the latter half of the twelfth century, are illustrated by PARKER, *Abbey Churches at Cuen*, in *Transactions of Inst. of Brit. Archts.*, 1862-63, p. 104.

The following mode of filling in, or grouting, the joints of work *already executed*, at the Rideau canal, off the Ottawa, in Canada, was found to succeed very well. A circular hole was drilled in one of the vertical joints, large enough to admit the end of a tin tube about 1½ in. in diameter. This tube was about 6 or 8 ft. in length, of which 8 ins. at the end were bent at right angles; about 6 ins. from this end a sort of cup was soldered to the tube, which projected about 3 ins. all round it; its use was to retain and compress the clay which closed the opening round the tube when inserted in the hole. All the joints of the wall, both horizontal and vertical, near the hole, were pointed with cement, and the tube inserted in the hole; cement (setting pretty rapidly under water) in a very liquid state was poured into the funnel at the top, and the pressure of the head of 6 or 8 ft., forced it in every direction into all the openings and vacant spaces in the wall. By this expedient walls were in many instances made water tight, when every other attempt had failed; still the original mistake of building the lock with common mortar instead of cement or hydraulic lime, has caused great injury to the works.

RAYNAL in the *Annales des Ponts et Chaussées* for 1837, has described the successful application of *béton*, for the purpose of stopping leaks in several works. Its composition is thus described: the strongest hydraulic lime was ground and sifted through a fine sieve. The best puzzuolana was then mixed with it in the proportion of 6 of puzzuolana to 4 of lime, and the compound well mixed and tempered, using as little water as possible consistent with such a state of fluidity as would allow it to flow through the open joints of the wall. At first the lime was slaked before mixing, but it was found afterwards more advisable to use it in a caustic state.

The instrument used was a wooden pump, with a bore of about 2½ ins.; to the end of this a wrought iron nozzle was applied with a bore of ¾ths of an inch, and this was inserted into the hole in the joint of the masonry. The piston was made of a block of oak about ¼th of an inch smaller in diameter than the bore of the pump, in order to allow it to pass easily down the barrel; and to prevent the grout escaping between the piston and barrel, a wad was placed over the grout. A hole, large enough to admit the nozzle of the pump, having been made at the joint where the leak was detected, or what was still better, at the point where the water made its entrance, the pump was filled with the grout, and the nozzle inserted into the hole in the joint, some oakum having been previously wrapped round it in order to prevent any leakage. Blows were then struck with a heavy mallet upon the head of the piston or plunger, and these were repeated until all the grout was forced into the vacant spaces in the wall. The pump (or syringe?) was then taken out and refilled, and the operation repeated till no more grout could be forced in.

As an instance of the pressure exerted upon the grout to force it into the joints of the wall, it is stated that although the pump was made of good elm 2 ins. thick, and banded with iron at both ends, it was cracked throughout its length, and it was

found necessary to roll some iron hoop round it, to prevent its splitting. In injecting a horizontal joint in the pier of a lock, two and even three courses above this joint were slightly raised by the mere force of the injection. The success attendant upon it was in some instances complete; in others, owing, it was supposed, to the difficulty of getting rid of the mortar which originally filled the joint, and which now prevented the circulation of the grout, there was still a slight leakage, but so trifling as to be of no importance. DENISON, in *Papers of the Corps of Royal Engineers*, 4to., Lond., 1839-40, iii, 134; iv, 208.

JOINTURE HOUSE. The new park at Fawsley, Northamptonshire, says BAKER, *History*, etc., fol., London, 1822-30, p. 384, "now incorporated with the old one, was enclosed in the reign of Elizabeth, and a secondary mansion erected in it, called the Lodge, which was generally held in jointure. Dame Anne Knightley (widow of Sir Richard), who died 1704, was probably its last inhabitant." DUGDALE, *Warwickshire*, 1st edit., fol., London, 1656, p. 509, mentions a lodge called Bergavenny, built by Joan, lady of W. Beauchamp, Lord Bergavenny, at Fulbroke, cir. Richard II-Henry IV. GAGE, *Hengrave*, 4to., London, 1822, p. 207, says there was a hunting lodge in the park to which the family occasionally retired. The Paston letters show that it was sometimes the same as the "secret house". At certain seasons the nobility retired from their principal mansions to some little adjoining lodge, where they lived privately. The "banqueting house" was used for the same purpose.

JOIST, formerly written Jotyes (1519) and Geyst (1532). A piece of timber laid from one support to another, and on which the boards of the floors are laid. Timber joists (Fr. *solive*) are called by various names according to their uses, which are explained s. v. **GROUND JOIST**; **COMMON or FLOOR JOIST**; **TRIMMING JOIST** (Fr. *lineoir*, and *chevêtre*; the joist receiving the end of the trimmer, *solive d'enchevêtre*); **BINDING JOIST** (Fr. *solive de remplissage*); **BRIDGING JOIST** (Fr. *lambourde*); **CEILING JOIST**. The space between two joists is called a **BAY** (Fr. *entretois*).

The regulations respecting weights and measures, as set forth in the books of the Carpenters' Company, was that "every load of joists to contain in number thirty joists; every joist to be in length 8 ft. 6 ins. of assize; in breadth 6 ins.; and in thickness 4 ins. from end to end, at the least, under a penalty of 2d. for every joist"; Bye Laws, Dec. 1607; JUPP, *Carpenters' Company*, 8vo., London, 1848, p. 150.

The strength of a joist depends upon the same principles as that of a GIRDER, the proportions being found by the rule of the breadth multiplied by the square of the depth, and divided by the square of the length between the points of support, all in inches. The result of general experience, independent of any particular experiment, where the ends of the joist are loose, is that its depth, for a joist 2 ins. in width, should be about $\frac{1}{4}$ of its length for a bearing of about 17 to 18 ft., and 12 ins. apart: thus 2 ins. being deemed sufficient for all practical purposes, such as holding the nails firmly and maintaining itself in a vertical position; and as much more strength is obtained by depth than by width, it is important not to increase the latter needlessly; the thinner the joist, the more weakness is to be apprehended from knots and other irregularities of structure, and the more tendency to twist. For a span of 17 ft. wide, or 204 ins., the depth would be 204 divided by 16 = $12\frac{3}{4}$ ins., and the above formula would be $\left(\frac{b d^3}{l^3}\right)$ or $\frac{2 \times 12\frac{3}{4} \times 12\frac{3}{4}}{204^3} = \frac{325}{41616} = \frac{1}{128}$ nearly. If the joist is to be $2\frac{1}{2}$ instead of 2 ins., the quantity 325 would be the same, but to find the value of the depth square, it must be divided by $2\frac{1}{2}$, when the depth square comes out 130 and the depth = $11\frac{1}{2}$ ins., making the joist $2\frac{1}{2}$ by $11\frac{1}{2}$ instead of 2 by $12\frac{3}{4}$. If the ends can be firmly fixed a double strength is obtained, which gives the formula = $\frac{1}{256}$

where the depth would be equal to 9 ins. (by 2 ins.); this, however, can seldom be done, but as they are often framed and spiked on to the wall plates, the latter formula might be reduced to $\frac{1}{162}$ and the depth $\frac{1}{18}$ of the bearing. In the

original one = $\frac{1}{221}$ and the depth $\frac{1}{21}$ of the bearing. The solidity of a floor is greatly enhanced by **STRUTTING** the joists.

These dimensions and the formula answer for the usual Baltic fir; when another quality of wood is used the formula must have the constant for the material to be employed. Again, an extra LOAD ON A FLOOR will require greater strength in the joists and girders. A useful paper with details of the strength of joists and girders for a floor, is given in *BUILDER Journal*, xii, 196-7. The now somewhat obsolete custom respecting joists was, that they should not have a bearing longer than 12 ft.; not lay less than 6 ins. on a wall, and be only 10 or at most 12 ins. apart.

A simple method of calculating the *strength* of materials is as follows. Taking the best yellow Baltic fir generally to bear either in compression or tension about 3 tons to the inch superficial, the formula for calculating the strength of a joist may thus be stated; let l = length of beam; d = depth and b = breadth, both in feet or inches; w = load including weight of floor and ceiling; and s = strength in compression or tension, = 3 tons, divided by 6, on account of the material not being at the same distance from the neutral axis, and also on account of lateral cohesion = one-sixth only of the other.

Therefore half the weight w multiplied by half the length $l = \frac{l}{2} \times \frac{w}{2}$ = leverage by the weight; now this must be counteracted by the leverage of the depth into its strength: its strength is as its area, or section, or its depth by its breadth by the strength of the material: or $\frac{l w}{4} =$ the leverage of the depth d into the area of the beam in inches = $d b$ into the strength per square inch $\frac{s}{6} = s \cdot \frac{l w}{4} = d \times d \times b \times s$; or taking the length of bearing and the depth in the same terms either in feet or inches, then, $\frac{l w}{4} = d^2 b s$ = breaking weight, or $d^2 = \frac{l w}{4 b s}$, and $d = \sqrt{\frac{l w}{4 b s}}$.

Taking one-sixth of the breaking weight for the safe weight, which is the utmost strain to which unframed joists should be subjected, the depth of a joist may be calculated for any weight in a few minutes, as it is generally advisable to take the breadth at not less than $1\frac{1}{2}$ to 2 ins. Thus, let the bearing $l = 20$ ft.; $w = 20$ cwt. uniform load; $b = 2$ ins.; $s = \frac{60 \text{ cwt.}}{6} = 10$ cwt. As the load is uniform, it is only equal to half the load applied at the centre. $\therefore \frac{20 \times 20}{8} = \frac{d^2 \times 2 \times 10}{6 \times 12}$; d being in inches must be divided by 12 to bring it into the same terms as the bearing, $\therefore \frac{20 \times 20 \times 6 \times 6}{8 \times 2 \times 10} = d^2$. $180 = d^2$. $d = \sqrt{180} = 13.4$ or the depth required; substitute this for d , and it follows that $\frac{20 \times 20}{8} = \frac{13.4 \times 13.4 \times 2 \times 10}{6 \times 12}$, or 50

49-877. Joists will always be found stiff enough for house floors if their depth in inches is three-quarters of the bearing in feet. The tables given by TREDGOLD are calculated for *stiffness* and not for *strength*, and require a much more laborious process in calculation.

A flooring of six timber joists 50 ft. long, was made in 1853 by S. Perkes, engineer. It supported a flooring of 2,500 sup. ft. Each joist was composed of lengths of half battens, placed vertically, $1\frac{1}{2}$ ins. thick, laid so as to break joint; these are covered at an angle of 45° by pieces of like thickness, which are again covered with similar planks to the first named, the

whole spiked together, forming a beam or truss $3\frac{1}{2}$ ins. thick and 20 ins. deep. With a weight of 20 tons placed on the floor, supported by these six joists, the deflection is said to have been scarcely perceptible. He secured the principle by a patent both for iron and wood; the cost for the latter, it is stated, is about 50 per cent. less than the ordinary construction; *BUILDER Journal*, xi, 671.

In fireproof floors, the iron work, either cast, wrought, or rolled, introduced as a bearer is often a 'joist', but more generally a 'girder'. The various systems are sufficiently noticed, *s. v. FLOOR (FIREPROOF)*, but to them should now be added the fireproof brick arched floors said to be devoid of any lateral thrust without ties, introduced by Capt. FOWKE, *Papers of Corps of Royal Engineers*, 8vo., London, 1861, x, new ser., p. 8: the "Dennett arch", made of a species of concrete with only a few joists or rods inserted: and the floor of a similar material poured upon a very coarse framework of iron bars, as employed in alderman Waterlow's lodging-houses, somewhat similar to the French systems. AUBERT, in DALY, *Revue Générale*, 4to., Paris, 1855, xiii, p. 9, etc., gives *Emploi du fer et de la fonte dans les constructions*, with examples. Manufacturers' lithographed sheets of sections can be readily obtained of the now universal "rolled iron joists" and patent "girders"; in a few instances tables of strength are submitted with them.

JOLI or JOLLI (DON ANTONIO) was born about 1700 at Modena. He was *baumeister* of the San Carlo theatre at Naples; became 1766 a member of the Academy of Arts at Venice; and died in 1777. 62. 69.

JONES (INIGO), son of Inigo Jones a clothworker, was born 1573, and christened 19 July in the church of S. Bartholomew the Less, West Smithfield. His father was then living in the parish of S. Bennet, Paul's-wharf; he died a few months after making his Will dated 14 Feb. 1596-7, and was buried by the side of his wife in the chancel of that church; the property was devised equally to his son and three daughters, Joan, Judith, and Mary, by the Will proved by the son on 5 April 1597. COLLIER, *Memoirs of the Principal Actors in the Plays of Shakespeare*, printed for the Shakespeare Society, 8vo., London, 1846, gives the registers of the baptisms of the family (*BUILDER*, iv, 410).

Jones's own words, commencing his book on *Stonehenge*, are "Being naturally inclined in my younger years to study the arts of design, I passed into foreign parts", in Italy,—searched out the ruins of ancient buildings,—and "returning to my native country, I applied my mind more particularly to architecture." From this passage it does not appear that he was sent abroad either by Lord Pembroke or Lord Arundel, as usually stated: they were also too young (CUNNINGHAM, *Life*, in Family Library, 8vo., 1831, p. 76). At Chiswick is preserved a small landscape by Jones. WEBB (in *Stonehenge*, p. 119) states that Christian IV, king of Denmark (1588-1648), "first engrossed him to himself, sending for him out of Italy, where, especially at Venice, he had many years resided. Upon the first coming of that king into England, he attended him, and being desirous that his native soil, rather than a foreign, should enjoy the fruits of his laborious studies; queen Anne here honoured him with her service first." Subsequently he says "Jones living so long in Denmark as he did." But these are doubtful statements on the face of them; and Christian did not arrive in England till 17 July 1606. Jones is also said to have returned with king James VI of Scotland and his queen. 19 May 1590.

Queen Elizabeth died 24 March 1602-3, and James VI having ascended the throne of England as her successor, his wife Anne, as queen, ordered a masque to be performed at Whitehall on Twelfth Night 1604-5, in which Jones assisted in "the bodily part" (BEN JONSON, *Works*, by GIFFORD, vii, 7). He next assisted on 28 August 1605 in three plays at Oxford, for "they also hired one Mr. Jones, a great traveller" (LELAND, *Collectanea*, 1770, ii, 631, 646): and subsequently

in the court masques of 1605-8, 10, 12-13, 22-3, 24, 25; 30, 1, 4, 6, 7, 9: on the 10 January 1618-9, "the masque was poor and I. Jones has lost reputation, for something extraordinary was expected, as it was the first in which the prince ever played"; *Records, Domestic Series*, 8vo., 1859, p. 552 (1858, p. 512).

In 1609 he appears to have carried letters into France from the king, an existing warrant is dated 16 June for £13:6:8 to be paid him for so doing. At the creation of Henry as prince of Wales, 4 June 1610, Jones was appointed surveyor of the works of his household, at a fee of 3s. per day (Harl. MS., 642, p. 253); the same Roll shows a gift to him of £30 (SHAKESPEARE SOCIETY, *Records at Court*, p. xvi). For the masque on 1 Jan. 1610-1 he was paid as "devyser for the said maske £16" (*Ibid.* p. viii). On the death of this prince 16 Nov. 1612, Jones's office expired. After the masque of 14 or 15 February 1612-13, he again visited Italy, as is proved by his copy of PALLADIO (*Architettura*, fol., Venetia, 1601), which contains important memoranda made by his own hand. The earliest date therein is that of Vicenza Mundaie, the 23rd of September 1613, accompanying a plan, elevation, and sections of the theatre drawn by Jones, with a description of it; also, Rome 2 January 1614; Naples 1614; Vicenza Quinto 13 August 1614; and London 26 January 1614 (*i. e.* 1614-5); Windsor 5 Dec. 1619; Theobalds 20 June 1621; Hampton Court 28 Sept. 1625; and a note 13 June 1639. This copy was presented to Worcester college, Oxford, by Dr. Clarke; the duke of Devonshire has another with the notes in Latin (WALPOLE, ii, 415, who appears to have seen in the college the other edition, 1613, of PALLADIO with the notes not very correctly copied into it). The original notes were proposed to be printed in the translation of PALLADIO's work by LEONI, fol., London, 1714, but were not given until his edition of 1742. An octavo sketch book with the date 'Roma 1614' is also in the possession of the duke, who published it in facsimile, cir. 1832; the contents are described in *ARCHÆOLOGIA*, xxiv, 354; copies exist in the library of the Society of Antiquaries; in Sir John Soane's museum; and in the British Museum.

On 27 April 1613 king James granted Jones the reversion of the office of surveyor of the works after the death (Oct. 1615) of S. Basil (*Records, Domestic Series*, 181); JUPP, *Carpenters' Company*, 8vo., London, 1848, p. 171, states he received the appointment 28 April 1614; but his pay commenced 1 Oct. 1615, being at the rate of 8s. per day, £80 per annum 'recompense of avails', and 2s. 8d. per day for riding and travelling charges: one list of the household (1628) gives him as fee only 2s. per day, and even 20d. as in former reigns, a clerk 6d., riding expenses 4s. and boat hire 4s., all at per day (Harl. MS. 1848, f. 216; MS. 1857; MS. 4237): also an annual livery (16 March 1615-6, Add. MS. 5755, f. 231; *ARCHÆOLOGIA*, xxvi, 332; and HUNT, *Tudor Arch.*, p. 188-9) which cost £12:15:10 (CUNNINGHAM, *Life*, p. 46). The same MS., f. 230, notes the livery for 1618. In 1629, in consequence of his having to pay rent for his official residence to Basil's heirs, an allowance of £46 was made to him. On accepting office, WEBB states that he offered to give up his salary until the debts of the department had been liquidated: the comptroller and paymaster at his persuasion followed his example, and the arrears were cleared.

In 1620 he was appointed one of the commissioners for conducting the repairs of S. Paul's cathedral, which do not appear to have been commenced until 1633-4, when on 4 Feb. "Inigo Jones was appointed surveyor, which he undertook *gratis*, nominating Edward Carter his substitute with a fee of 5s. per diem; Michael Griggs to be paymaster. The stone to be provided from the third bed of Oxfordshire stone, or of the soft quarry of Portland stone. The work not to be begun until there was £10,000 'ready in bank'; yearly account to be rendered" (*Records*). In 1620 also, whilst at Wilton, Inigo "received his Majesty's command to produce, out of his own practice in architecture, and experience of antiquities, whatever he could possibly discover concerning Stonehenge." The result

of his inquiries appeared after his death, in the notes put together by WEBB, *Antiquity—Stone-Heng*, fol., London, 1655, fifteen sheets; and a second edition, *The most notable Antiquity of Great Britain*, fol., London, 1725, with several comments by CHARLTON 1662, and WEBB 1664. He was appointed 1633-4 on the "commission for restraining new buildings."

Having taken the part of his master Charles I. in his troubles, he was "thrust out of office for loyalty in 1643", and was fined £345 in 1646 by the parliament for being a favourite and a Roman Catholic, being taken in arms at the capture 20 (?) October 1645 of Basing house, after a two months' siege, where he served under the marquis of Winchester (RATHBONE, *Lady Willoughby's Diary*, 4to., London, 1814, pt. i, p. 144, states that "Inigo Jones, the great builder, is one of the prisoners", together with Robinson, actor, Hollar, Peake, and Faithorne, engravers; CARLYLE, *Cromwell*, 2nd edit., ii, 259). Early in the civil wars, he and Stone, the sculptor, buried their money in Scotland-yard, subsequently removing it with their own hands and burying it in Lambeth-marsh (WALPOLE, ii, 416). During this time Francis Carter, who had held the appointment of chief clerk of the works in the king's household, was made surveyor of the works, and held it during the Commonwealth and the Protectorate, at least as late as 1651.

Having survived the friends to whom he was indebted for his advancement, his associates, and his patrons, it is generally stated that grief, misfortune, and old age, terminated his life in the 79th year of his age, at Somerset house in the Strand, on the 21 June 1652. He was buried on the 26th, and at his own desire by the side of his father and mother, in the church of S. Bennet, Paul's Wharf, where a monument of white marble, for which he left £100, was erected; the building was destroyed by the fire of 1666; but the epitaph copied four years afterwards, is given by KENNET, in *Wood, Ath. Oxon.*, by BLISS, 4to., Oxford, 1813-20, iii, 806 (see iv, 753); and in CUNNINGHAM, *Life of Inigo Jones*, published by the Shakespeare Society, 8vo., London, 1848, whose carefully selected details have been followed herein generally, as the most authentic yet published, and to which work reference must be made for the many other authorities for dates, etc. The *BUILDER Journal*, iv, 37, etc., contributed much information before that work. Jones is presumed to have been a member of the Joiners' Company (JUPP, p. 180), perhaps from the tradition that he was apprenticed to one of that trade.

His Will, preserved in Doctors' Commons, was proved 24 August 1652 by John Webb, his executor and pupil (not relative, as often asserted) who had "married Anne Jones, my kinswoman", as stated therein. It also declares that Richard Gammon (probably the then clerk of the works at the Tower of London and Somerset House under the Board of Works) of S. Mary Savoy, had married Elizabeth Jones his kinswoman; and Henry Wagstaff, deceased, had married Mary his kinswoman; it may be presumed that Jones's sisters were dead, as they are not mentioned. £4,200 are named in thirteen paragraphs for distribution; so that he did not die "in poverty" as is often stated.

Webb appears to have preserved the books and drawings: that Jones's library was a good one for the period may be inferred from PEACHAM, *Complete Gentleman*, 4to., London, 1622, p. 137, who states that he could find VASARI, *Vite*, only in that and in another library. Webb left his collections to his son William, with strict injunctions that they should be kept together. A large part containing the designs for S. Paul's, the Banqueting house, and for Whitehall palace, belonged in Aubrey's time (*Lives*, ii, 411) to J. Oliver, city surveyor, subsequently to Dr. Clarke (who possessed them in 1716), and another to the earl of Burlington; the former bequeathed his portion (died 1736) to Worcester college, Oxford; and the other descended to the duke of Devonshire. Lord Burlington had a copy of "Vitruvius" noted in the same manner as the "Palladio" (WALPOLE, ii, 415). Jones's autograph was in a

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copy of ANDROUET DU CERCEAU, *Livre des édifices antiques*, fol., Paris, 1584, sold at J. Gwilt's sale in 1854; in Sir John Soane's museum is a SCAMOZZI, *Civil Architecture*, with a MS translation supposed to be by I. Jones; while in Worcester college library are, a SCAMOZZI 1615 with a partially obliterated autograph; DE LORME, *Le Premier Tome*, 1567, with a perfect autograph; the VASARI *Vite* noted above, with the autograph partly hatched over; and a VIOLA ZANINI 1629. The duke of Devonshire also possesses two folio volumes of a collection of designs for habits and masques at court; some boxes of architectural drawings, many of them perhaps by Webb; and others of roughly coloured designs for scenery in masques. Eight ground plots and profiles of scenes by Jones are in the Lansdowne MSS., British Museum, No. 1171.

His official residence was of course in Scotland-yard: WALPOLE, ii, 414, states that he lived some time at Staines; he is said to have built a house for himself near Charlton in Kent; and another in S. Martin's-lane, from which place he made his Will.

Jones sat at least twice to Vandyck for his portrait; the finished picture was sent with the Houghton collection to S. Petersburg; a sketch *en grisaille*, engraved by Hollar in 1655, for the first edition of the *Stonehenge*, is in the possession of Lieut.-Col. Inigo W. Jones, to whose great-grandfather (died 1756) it had belonged; it was also engraved for the *Life* by CUNNINGHAM; and was exhibited in the Portrait Exhibition 1866, with another portrait sketch. Col. Jones has also a copy of the Houghton picture, given to a member of his family by Lord Onslow. It was also engraved by Van Voerst before 1635; another by Gaywood, cir. 1666. A portrait belonging to Lord Darnley was exhibited at the British Institution 1820. Lord Yarborough has a clever copy *en grisaille*. Lord Burlington had a portrait by Dobson. Lot 65 of the first day's sale of Vertue's pictures was "a head of Inigo Jones", said to be by Vandyck. Another portrait by F. Nogari, painted at Rome, is in the king's gallery at Kensington palace. On the staircase at the Ashmolean museum is an original likeness, but it is a poor performance (painter unknown). His head in an oval was engraved by G. Villamoena (died about 1626) "while he was in Italy," says WALPOLE. GOLDCUTT, *Heriot's Hospital*, 4to., London, 1826, gives a profile "from a small cameo in possession of the hospital." The bust of Jones by Rysbrach, could not have been done from the life; nor the portrait by Kent in the green room; both at Chiswick. A large emblematical picture with a medallion of Jones therein, painted by Kent, was engraved by B. Baron.

Although it has been stated that Jones "first introduced design, till then unknown, into England, and established a taste for architecture, following the track of Palladio", the works of his predecessors, as detailed s. v. ELIZABETHAN ARCHITECTURE, must not be forgotten, for among them are some comparatively pure buildings in the Italian style, although not on the grand scale adopted by Jones in his best productions.

LIST No. I.

The following is a list of works designed by, and probably executed under, Jones; but it does not include the works carried out in discharging the duties of his office at the various palaces, as Richmond, Theobalds, S. Alban's, S. James's, Woodstock, etc., of which no accounts exist.

In the following lists, C. stands for CUNNINGHAM, *Handbook of London*; W. for WALPOLE, *Anecdotes of Painting*, etc.; M. for MILIZIA, *Lives*, translation by CRESY.

1607-12. Charlton house, Kent, built for prince Henry; west front afterwards by Sir Henry Knevitt. Only great entrance gates and colonnades, says WALPOLE. NICHOLS, *Prog.*, iii, 612.

1607 (?) Bramshill, Berkshire, also built for prince Henry.

1615-21. Houghton hall, Bedfordshire, for countess of Pembroke; porticoes, copy of 'La Carità' of Palladio. In ruins. BUILDER, iv, 494, 521.

1616. Dorfold or Dorfold hall, Cheshire, for Ralph Willbraham.
 1615-36. Crewe hall, Cheshire, for Sir Randal Crewe; restored 1837; greatly burnt 1860.

Original ground plan by "I. J.", showing the three stories, belongs to T. W. Jones of Nantwich, *Athenaeum*, 1857, p. 976.

- 1618-35. Aston hall, Warwickshire, for Sir Thomas Holte.

RICHARDSON, *Studies*, etc., suggests that these three buildings were erected in this order and by the same architect (ELIZABETHAN ARCHITECTURE, p. 30). A plan for Sir Thos. Holt is amongst John Thorpe's drawings.

1617. Star chamber, design and model. C., 551; NICHOLS, *Prog.*, iii, 344.
 1617-23. Lincoln's Inn chapel (Gothic); open cloister under it; estimated cost £2,000. DUGDALE, *Origines Judiciales*, 34; C.

- 1617-35. Greenwich, queen's house, to cost £4,000; now the centre of royal naval school (ALEXANDER). CAMPBELL, i; RECORDS, s.d. 1617.

1618. Lincoln's Inn Fields, laid out; 12 acres; 187 x 237 yards. C., 288.

- 1619-22. Banqueting house, Whitehall, for king James I; cost £14,940; restored 1831 (see drawings).

CAMPBELL, i; elev. by J. Spilbergh, 1683; elev. and details by O. Hansard, 1849.

1620. Queen-street, Lincoln's Inn Fields, and houses on the south side having the fleur-de-lis thereon. BAGFORD, *Harl. MS.* 3910, fol. 50b; C., 415.

1621. Beaufort house, Chelsea; gateway, removed 1740 to Chiswick.

C., 42.

- 1622-3. New hall, Essex; alterations to modern fashion for duke of Buckingham, who bought it in 1622; house had cost £14,000 in building, etc. NICHOLS, *Prog.*, iii, 778, from Birch MS. Brit. Mus. 4174.

1623. Queen's chapel, S. James's. W.

1625. Catafalque for funeral of James I. View in NICHOLS, *Progresses*, iii, 1049; and SANDFORD, *Gen. Hist.*, W.

1629. Holland house, Kensington; piers to a gateway near the east side; carved by N. Stone; cost £100. W.

- 1631, c. Covent Garden piazza, for the duke of Bedford.

C., 143, 394; CAMPBELL, ii.

- 1631-5. Oxford, S. John's college; arcades and porticos of inner quadrangle; and garden or east front, for archb. Laud. INGRAM, *Memorials*, W.

- 1631-8. S. Paul's Covent Garden church, for duke of Bedford, cost £4,500. Jones was present at its consecration; *Harl. MS.* 1831. (HARDWICK)

MALTON, p. 47; BRITTON and PUGIN, i, 107; CAMPBELL, ii.

1632. Denmark, afterwards Somerset, house, chapel for queen Henrietta Maria, who "on Friday (Sept. 20th) at eleven in the forenoon with her own hands helped to lay the two first square corner stones, with a silver plate of equal dimension between them." (ELMES, *Life of Wren*, 4to., London, 1823, p. 10, gives an estimate made May 1635 by C. Wren, sen., for a building including a chapel, for the queen, amounting to £14,325.) ELIAS, *Letters*, iii, 2 ser., 271; C., 457.

1632. Oxford, gateway and stone wall, 14 ft. high, to the Physic garden, carved by N. Stone, sen., cost over £5,000.

- 1633-49. S. Paul's cathedral; modernization of the transepts and nave, and erection of the portico to west front, 200 ft. long, 40 ft. high, and 50 ft. deep (see drawings).

C., 380; KENT, *Designs*; Hollar, ext. & int. views, dated 1656.

1634. Tomb to G. Chapman the poet, south wall of church of S. Giles-in-the-Fields, at Jones's expense. PARTON, *S. Giles*, 223.

- 1634-7. Barber Surgeons' hall, Monkwell-street; theatre was pulled down, cir. 1783 (see drawings). C., 31.

1637. Oxford, porch to S. Mary's church, for Dr. M. Owen, chaplain to archb. Laud, cost £230, carved by N. Stone. W.

1639. Whitehall, general designs for new palace. (See drawings: on those in the British Museum, it is noted that they were presented to king Charles in that year.) CAMPBELL, ii; KENT.

1640. Ashburnham house, Little Dean's-yard, Westminster, for the Ashburnham family; greater part burnt 1731; two rooms, a staircase, and an alcove in garden, remain. BRITTON and PUGIN, ii; Drawings at R.I.B.A.

1640. Lindsey or Ancaster house, No. 59, Lincoln's Inn Fields, for Robert Bertie, earl of Lindsey. CAMPBELL, i; C., 290.

- 1640-8. Wilton, Wiltshire, for Lord Pembroke; the garden front (see drawings) and a grotto at end of the water (CAUS). CAMPBELL, ii.

1641. College of Physicians, Warwick-lane; buildings in rear (see drawings).

1650. Coleshill, Berkshire, for Sir Mark Pleydell, Bart.

Elev. by G. YERTUE, 1735.

- Thanet, afterwards Shaftesbury, house, 35 and 38, Aldersgate-street, for Tufton, earl of Thauet. C., 6; W.

- Barley-on-the-Hill, Rutlandshire, for the duke of Buckingham; burnt 1645. DALLAWAY.

- Whitehall, cabinet for the king's pictures. View in PENNANT, *Lond.*

- York house, Strand, for duke of Buckingham (see drawings). DALLAWAY, *Disc.*

- Newmarket, design for a palace (a house was built, WEBB). W.

- Windsor castle, piers. LANGLEY, *Masonry*, 341.

- The Grange, Hampshire, for Lord Chancellor Henley; existing with large additions by W. Wilkins and C. R. Cockerell. W.

- Outlands, Berkshire; gateway to the old palace, since removed and repaired. W.

- Ascot house in Wing, Buckinghamshire, 'a noble room', for Sir W. Dormer; pulled down cir. 1720. W.

- Cobham hall, Kent, for James, duke of Richmond and Lennox; centre portion of front, and a ceiling. W.; CAMPBELL, ii.

LIST II. DRAWINGS.

The designs for Whitehall engraved in the *Vitruvius Britannicus*, fol., 1717, are considered to be not genuine but made up; it is stated therein, however, that the "drawings were obtained from Wm. Emmett, esq., of Bromley". The drawings in Worcester college are also said to have belonged to Emmett, and may claim to be those presented to Charles I. in 1639 (POPE's *Works*, WARTON's edit., v, vii, p. 322); and in the British Museum are several original drawings (obtained 1848) being elevations and plans chiefly, which formerly belonged to Emmett, as some of them retain his remarks; there is also a design made by him for the north front, 1717, as Jones's original drawing had been lost; with some outline copies of elevations: the plans do not show the circular court, given in CAMPBELL's work, and must be either the first ideas or modifications, as the plan is marked "600 ft. depth", those given by CAMPBELL being 1200 ft. by 874 ft. along the river. A series of the design, drawn on vellum, are in the royal library at Windsor.

The drawings at Worcester college comprise among others:— Upright for my Lord Maltravers his house at Loatsbury 1638; design for Sir Peter Killigrew's house in the Blackfriars, marked "Mr. Surveyor's design"; ceiling of the countess of Pembroke's bedchamber; ceiling of the great staire at Wilton, and the ceiling in the cabinet room, 1649; ceiling of the countess of Carnarvon's bedchamber, and of withdrawing room; an enriched and gilt ceiling in panels for York house (duke of Buckingham); wainscott and moulds for the consultation room and library at Physicians' college 1651, "not taken"; design for Chirurgical's theater 1636; designs for temples and for churches; for a fountain in a wall at Greenwich 1637; for the modell of the Starr chamber 1617; for exchanges or merchants' piazzas; office of the works at Newmarket; pencil drawing of a portion of the banqueting house with statues; an early design for S. Paul's, Covent Garden; a pencil drawing of the portico to S. Paul's cathedral with statues; an upright of the palace at Somerset house 1638, "not taken"; several elevations and ground plans of a house for the earl of Pembroke, on the site of Durham house in the Strand, signed John Webb 1649, "not taken".

Jones's designs have been illustrated in CAMPBELL, *Vitruvius Britannicus*, fol., London, 1715-32; in KENT, *Designs by I. Jones and others*, fol., Lond., 1727, from drawings by Flitcroft, and again 1770; from this work a plate of "palaces and houses designed or built by I. Jones" has been engraved without discrimination, in DURAND, *Parallèle*, fol., Paris, n.d., pl. 56. His smaller works, as chimneypieces, ceilings, etc., were engraved by WARE, *Body of Arch.*, fol., London, 1756, and again as *Designs of I. Jones and others*, 4to., London (1756); by VARDY, *Some Designs of I. Jones and W. Kent*, fol., London, 1744; and by HOPFUS, in his edition of PALLADIO, *Architettura*, fol., London, 1736.

LIST III.

Works attributed to Jones, and probably designed by him, are:—

- 1614-7. Dulwich college, Surrey, cost £10,000, now mostly rebuilt.

PENNY CYC., s. v.; and CHAMBERS, *Life of Alleyne*.

1615. c. Brympton manor house, Somersetshire, formerly seat of Sir Philip Sydenham; garden front, and stabling. W.; BUILDER, iv, 31, xiv, 479.

- 1625-35. Castle Ashby, Northamptonshire; the south front with the screen two stories high. W.; CAMPBELL, iii; ROBINSON, *Castle Ashby*.

- bef. 1627. Hinton S. George, Somersetshire, for earl Paulet; garden front. W.

- 1628-31. S. Katherine Cree church, Leadenhall-street; perhaps interior only (Gothic). M.; C.

1620-32. Forty hall, near Enfield, Middlesex, for Sir Nicholas Rainton; undermined 1700; only the gateway to the stables standing in 1858.

DALLAWAY; LYSONS.

1630. Rainham hall, Norfolk, for Sir Roger Townshend, Bart.

NICHOLS, *Prog.*, iii, 267-8.

1630-4. Stoke park, Northamptonshire, for Sir Francis Crane; design obtained in Italy; wings, colonnade, and foundations superintended by him; stopped by civil wars. W.; BAKER, *North.*, ii, 244; CAMPBELL, iii.

1631. Staines church tower (Gothic). W.; LYSONS, *Hist. Acc.*, 244.

1632. S. Alban's church, Wood-street. GODWIN, *Churches*.

1632. Sion house, Isleworth, for Algernon Percy; employed to finish it, to new face the inner court, and finish great hall (GLOVER; JANSEN). W.

1633. Gwydyr chapel. PEN. CYC., s.v. Denbigh.

1636. Bridge over the Conway at Llanwast, Llanrwst, or Llanvrost, or at Gwydder, Denbighshire, 56 ft. span, for duke of Ancaster. (Curious account of Jones and this bridge, in PASQUIN, *Artists of Ireland*, 8vo., London, 1796, p. 28, who says it was done 1695 for Sir John Wynne, whose daughter married the duke of Ancaster.)

W.; CRESTY, *Encyc.*; ANC. RELIQUES, i; PEN. CYC., s.v. Denbigh.

1640. Chevening house, Kent. W.; CAMPBELL, ii.

1642. Northumberland house, Strand, for Algernon Percy; fourth or garden front (GLOVER).

1652. c. Judd house, Ospringe, Kent, for Daniel Juddle.

HASTED, *Kent*, ii, 797.

— Lees court, alias Sheldwich, Kent, for Sir George Sondes; front.

HASTED, *Kent*, ii, 783; NEALE, iv, ser. 2.

— Troy Mitchell, near Monmouth, for duke of Beaufort.

MADDEN, *Privy Purse Expenses*, 271.

— Cherry Garden farm, near Charlton, Kent, for his own residence.

LYSONS, *Enviens*, iv, 330.

— Woburn abbey, Bedfordshire, for the duke of Bedford; the grotto and some small parts. W.

— Thorney abbey (1 Northamptonshire); some small parts. W.

— Beckett, near Farringdon, Berkshire, for Lord Barrington; a banqueting room, supposed to be the first garden building in England.

W.; HUNT, *Arch. Camp.*, ix.

— Fishiobury, Hertfordshire, for Sir Walter Mildmay. W.

— Chilham castle, Kent; by Sir D. Digges; portions. W.

LIST IV.

Works attributed to Jones, many of which are quite unworthy of his name, are:—

1588-1609. Lulworth castle, Dorsetshire. BURKE, *Visit.*, ser. 2, ii, p. 32.

1600. c. Charlton park, Wiltshire, earl of Suffolk; west front.

WARNER, *Excursions*, 232; PATERSON, *Roads*.

1603. c. Westminster abbey; tomb in south aisle to Mary queen of Scotland; in north aisle, those to queen Mary, queen Elizabeth, and the infant daughter of James I. (No memorials exist to James, Anne, or prince Henry.)

1604. Copenhagen. Rosenborg palace.

1610. Plas Teg, near Trevalyn hall, Denbighshire, for Sir J. Trevor, or — Roper, esq. PATERSON, *Roads*; NEALE, v.

1612. c. Caverswall castle, Staffordshire, for Matthew Cradock, esq.

1616. Flixton hall, Suffolk, for Sir John Tashburgh; burnt 1846.

NEALE, iv; *Illustr. London News*, ix, 393, 404.

1625. Bath, town hall and market house; pulled down 1777.

COLLINSON, *Somerset*, i, 31.

1625. Burton Agnes hall, Yorkshire, for Sir F. Boynton, Bart.; additions.

PATERSON, *Roads*.

abt. 1628. Calne church, Wiltshire; tower on north side, (good proportions, Gothic).

PENNY CYC., s.v.

bef. 1630. Pengwern place, Flintshire, for Evan Gryffydd, esq. NEALE, v.

1636. Pendhill, near Blechnigley, Surrey, for R. Glyd, esq.

BRAYLEY, *Surrey*, iv, 112.

1638. Kirby hall, Northamptonshire, for Lord Hatton; alterations and north front of inner court, (to J. Thorpe's house, 1670). NEALE, iii, ser. 2.

1640. Combe abbey, Warwickshire, for Lord Harrington.

1640. Furnival's-inn, Holborn; (since rebuilt).

1640. Rolls' chapel, Chancery-lane, (Gothic exterior).

1642. Cambridge, Christ's college; second court repaired. A. P. S., s.v.

bet. 1638. Wisbeach castle, Cambridgeshire, for John Thurloe; portions taken down.

LYSONS, *Comb.*, 290.

— Widcombe house, near Bath. A. P. S., s.v.

— Albins, near Ongar, Essex, (Gothic). W.

— Ashton court, Somersetshire, for — Lyons, esq.

PARKER, *Dom. Arch.*, iii, 335; COLLINSON, *Som.*, ii, 294.

— Eastham church and Bobbington church, Cheshire; towers only, (Gothic). ORMEROD, *Cheshire*; REED, in *Liv. Arch. Soc. Proc.*, i, 11.

— Ruperra, Glamorganshire, for — Morgan, esq.; (inside burnt 1783).

NEALE, v.

— Tredegar, Monmouthshire, for — Morgan, esq. (and several other houses in the county).

NEALE, v; iv, ser. 2.

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— King's Weston, Gloucestershire, for Lord de Clifford; (mostly rebuilt by Sir J. Vanbrugh). NEALE, ii.

— Llangibby castle, Monmouthshire, (altered the grange to the old castle). BURKE, *Ext. Bar.*, 567.

— Clifton Maubank, Dorsetshire; gateway.

DALLAWAY; HUTCHINS, *Dorset*, ii, 461.

— Winchester cathedral, Hampshire; Roman screen between nave and choir, (removed). M.

— Waller house, ; garden front. M.

— Burton Constable, Yorkshire; (pulled down).

WHITAKER, *Yorks.*; ALLEN, *Yorks.*, iii, 8'4.

— Fonthill, Wiltshire, for Lord Cottington (?); (house pulled down, but there still exists the gateway entrance to old park).

WARNER, *Excurs.*, 120; NEALE, i, ser. 2.

— Drumlanrig castle, Dumfriesshire, for duke of Buccleugh.

CAMPBELL, i; FORSYTH, *Beauties*, v, 568.

— Bower hill, near Melksham, Wiltshire. BRITTON, *Wilts*, iii, 216.

— Condover park, Shropshire, for Sir — Owen; centre.

NEALE, ii, ser. 2.

— Dumfries, the 'mid steeple' or town hall. BLACKIE, *Gazet.*

— Lismore castle, Ireland; portico. WRIGHT, *Ireland Ill.*, 43.

— Beaupre, Glamorganshire; large porch of three orders, "esteemed the best piece of modern architecture of any in Wales."

GENTLEMAN'S MAG., 1785, iv, 936.

— Stapleton hall.

— Broom hall, Kent.

— House, Angel-court, Throgmorton-street; carved panel.

BUILDER, iii, 490.

— House, No. 5, Chandos-street, Strand; carved railing to stairs.

BUILDER, iii; Drawing in R. I. B. A.

— Leghorn; façade to the cathedral designed by G. F. Cantagallina, who died 1656.

M.; A. P. S., s.v.

— Leghorn; a palace. M

— A windmill, Warwickshire.

BUILDER, i, 255; ii, 96; CIVIL ENGINEER, vi, 298.

— Ford abbey, Dorsetshire. PATERSON, *Roads*.

— Pynes, near Exeter, formerly the seat of Sir Stafford Northcote, Bart.

ACKERMANN, *Repos.*, v, ser. 3, p. 65.

— Bowyer house, Camberwell, for Sir A. Bowyer; pulled down 1861.

LIST V.

Works attributed by many critics to Jones, but executed or designed by others; and built before or after his dates (1604-52), are:—

1566-7. London, Royal Exchange (Gresham's building, by Heinrich).

DALLAWAY, *Disc.*, 90.

1588-90. Edinburgh, Holyrood palace; front (by W. Schaw). M.

1594-6. Stonyhurst, near Malham Craven, Lancashire, for Sir R. Sherburne.

WHITAKER, *Whalley*, 464, 502.

1598. Linlithgow palace, Linlithgowshire, for James VI; one side.

FORSYTH, *Beauties*, iii, 605; BILLINGS, in R. I. B. A. *Trans.*, 1849-50, p. 15.

1600. c. Fredericksburg palace, Zealand, for Christian IV. (burnt Dec. 1859).

FELDBERG, *Denmark*, ii, 88, being led to say so by D. Laing (as below), who remarks "the probability is that Jones never set foot either in Denmark or Scotland," or Wales is now added.

1806-21. Glamis castle, Forfarshire, for Patrick earl of Kinghorn (1606-15); more modern part.

Sir W. SCOTT, *Mis. Works*, xxi, 97.

bet. 1609. Leghorn, the piazza. M.; W.

1626. York stairs water gate, Buckingham-street, for duke of Buckingham (by N. Stone, sen.). M.; W.; CAMPBELL, ii; BUILDER, xii, 359.

1628-47. Edinburgh, Heriot's hospital (by Dr. Balcanquhall, or by William Wallace, the master mason).

M.; ELMES, ARNOT, *Hist. of Edinb.*, 1770, first attributed it to

Jones. LAING and RHIND, *Arch. Inst. of Scotland*, *Trans.*, ii.

1636. Aldermaston, Berkshire, for Sir Humphrey Forster, Bart.

NEALE, iv, ser. 2.

1654. Amesbury, Wiltshire, for Lord Carleton (by J. Webb).

M.; KENT, *Designs*.

1656. Thorpe hall, or Longthorpe, near Peterborough, for Oliver St. John (carried out by J. Webb). HAKEWELL, *Arch. of 17 Cent.*, fol., 1856.

1660. Bedford house, Bloomsbury-square; pulled down 1800.

1663. Gunnersbury, near Brentford, Middlesex, for Sergeant Maynard; nearly pulled down 1801 (by J. Webb). M.

1664. Greenwich hospital, for Charles II; east part of north-west mass (by J. Webb); (attic by Sir C. Wren). M.; CAMPBELL, i.

1677. Abingdon county hall; restored (?) 1852. BUILDER, x, 500.

1677. Cashiobury, Hertfordshire, for the earl of Essex (by H. May). M.

1683. Dublin; the Tholsel. WALSH, *Dubl'n*, 107-8.

1707. c. Waldershare, Kent, for Sir Henry Furnese. HASTED, *Kent*, iv, 189.

1722. Dormitory at Westminster school (by Lord Burlington).

ELMES, in *Civil Eng.*, x, 168.

H

1740. *c.* Harcourt house, Cavendish-square (by T. Archer or E. Wilcox).

— Devonshire house, Piccadilly, for Lord Burlington; burnt 1734; (by J. Webb and J. Denham).
ELMER, in *Civil Eng.*, x, 168.
DALLAWAY.

— Sherborne, Gloucestershire (by E. or F. Carter).

DALLAWAY; FOSBROKE, *Glow.*, ii, 389.

— Richmond; the ranger's lodge (? by R. Stickle)

— Highnam court, Gloucestershire, for Sir W. B. Guise, Bart. (by F. Carter).
PATERSON, *Roads*.

JONES (RICHARD) third earl of Ranelagh "built a house after a design of his own" 1690, on land on the east side of Chelsea hospital, to which he was one of the commissioners; he died in 1712; FAULKNER, *Chelsea*, 8vo., London, 1829, ii, 299.

JONES (RICHARD), "an eminent architect and surveyor, and the author of that useful work, *The Builder's Vade-Mecum, or practice of Surveying, etc., with Specifications*, 8vo., Lond., 1809; also of *Every Builder his own Surveyor*, 8vo., 1809", died at Worcester 17 January 1826 aged 70. His son was "of Covent Garden Theatre;" ANNUAL REGISTER, p. 223.

JONES (WILLIAM) designed 5 April 1742 the amphitheatre, 150 ft. interior diameter, in Ranelagh Gardens, Chelsea, of which there exists a "perspective view as intended to be finished," and a "geometrical section with the orchestra and orthographical plan of the amphitheatrical building." There is also a perspective view of the interior, done by W. Newbould, 1761; and some large views of the rotunda, etc., by Rooker, from drawings by Canaletti, 1751. It was closed after 8 July 1803, and 30 Sept. 1805 an order was made for taking it down, LYSONS, *Environ.*, supp. 4to, 1811, 120-1. Sir John Soane's museum has copies of the two first plates. FAULKNER, *Chelsea*, 8vo., London, 1829, ii, 300-14. This is probably the "Wm. Jones, architect", a subscriber to *Views of London Churches*, obl. fol., London, 1736.

JOPYS or JOPIES. The collar beams of a roof. They were ordered "to be fair and curiously embowed by the carpenter". The "jopys in the hall" were coloured. It is suggested by GWILT that the word is derived from *joug*; the action of the collar in a roof being to yoke the rafters together. The colouring of the "jopies" by the plasterer, must have been applied to the embowed spaces in the ceiling between the beams; as noted in the plasterer's account, in GAGE, *History of Hengrave*, 4to., London, 1822, p. 42, where 'jopyse' misprinted 'ropysse', occurs several times; GAGE, *Thingoe Hundred*, 4to., London, 1838, pp. 140, 150. 17.

JORAGHUR in India, see JAINIST ARCHITECTURE.

JORDAN, a monk, designed 1207 together with Berthold, also a monk, the plans of the monastery at Walkenried, in Germany. 92.

JORDAN (MAESTRO), said to have been the architect of greatest repute in his time in Aragon, constructed 1138, by order of the king, the castle of Feliciana at Sos. 66.

JORGE (TEOTOCUPOLI), built 1631 the Mozarabic chapel in the cathedral at Toledo, with a gothic entrance. It is square on plan, finished with a hemispherical cupola in the Græco-Roman style. 116.

JORGEN, continued 1470-80 the tower of the cathedral at Frankfurt-am-Main.

JOSE (DIAZ GAMONEZ) living in the eighteenth century, constructed the glass manufactory, and the barracks for the gardes-du-corps, at San Ildefonso, in Spain. CAVEDA, *Arquitectura en España*, 8vo., Madrid, 1848. 116.

JOSSÉLIN, JOUSSELIN or JOSCELIN, DE COURVAULT, in 1260 followed king (Saint) Louis IX to the Holy Land. He was an engineer and inventor of many machines of war, and is said by DALLAWAY, *Discourses*, 8vo., London, 1833, p. 168, to have been associated with Eudes de Montreuil, the architect of the Sainte Chapelle at Paris, and of the abbaye de S. Dominique at Poissy, upon a misapprehension of the words in *Le Noir*, *Musée des Mons. Franc.*, 8vo., Paris, 1800-6, ii, p. 19. 56. 69.

JOSSENAY or JOSSENET (. . .), member 1717 of the academy of architecture in Paris; succeeded Jean Courtonne in 1738 as professor of architecture. He died 1748. 5. 69.

JOST (.) was *baumeister* 1440, at the tower of the cathedral at FRANKFORT-am-Main. He may probably be the same as Jost DOTZINGER who was engaged at Strasburg from and after 1452. 92. 116.

JOUBERT (CHARLES) was born 16 March 1640 at Paris. He designed and constructed the amphitheatre of the académie royale de chirurgie de Saint Côme, rue de Cordeliers, at Paris, which is highly praised by BLONDEL, *Arch. Franç.*, fol., Paris, 1752, ii, 84; and according to MÜLLER, the convent of the Trinitarians in the rue des Mathurins. He died 30 November 1721.

JOUBERT (LOUIS), son of the preceding, was born 2 Jan. 1676 at Paris. He designed the other buildings of the academy above named, which were continued by T. Arnould: and the *portail* and enclosure of the cour des Mathurins. The date of his death is not recorded. 5. 116.

JOUE (JACQUES DE LA) designed 1698 the grenier de Sel, rue de S. Germain, at Paris (BRICK, *Descr.*, 12mo., Paris, 1725, i, 210); and the château de la Chapelle, near Nogent on the Seine. 5.

JOUI (MANSARD DE), see MANSARD.

JOUNPUR, in India, see JAUNPORE.

JOURNEYMAN (from Fr. *ournée*, a day's duration; Ger. *tagelöhner*). A workman, out of his apprenticeship, who is employed to perform work by the day.

JOUSSELIN, see JOSSELIN DE COURVAULT.

JOVARUM. The ancient name of Salzburg, in Upper Austria.

JOWE or GOWE PIECE, see JAWE PIECE.

JOYNES (HENRY) was clerk of the works at the building of Blenheim palace, Oxfordshire, under Sir John Vanbrugh and N. Hawksmore, from 1705 to its completion in 1715; (Addit. MS. 19,607, contains many of his replies to N. Hawksmore's letters), in which year on 4 May he was appointed by the king, clerk of the works at Kensington palace on the promotion of Hawksmore (HISTORICAL REGISTER). On 25 Nov. 1727 "Henry Joynes, Gent.," was appointed by R. Arundel, surveyor-general, as clerk of the works and storekeeper at Kensington palace; the warrant, with the signatures of Ripley and Kent approving his qualifications, are in the British Museum, Add. MS. 20,101, p. 25; and his signature on p. 41, dated 28 Aug. 1745. He held the appointment at least as late as 1748; but had been succeeded before 1755 by J. Vardy. The GENTLEMAN'S MAGAZINE records the death 2 July 1754 of "Henry Joynes, of Kensington, esq., an eminent architect." Linley hall, Shropshire, is attributed to one of this name.

JOZUE (JAN), imperial *baumeister* of Gitezin, in Bohemia, reconstructed 1783 the tower at Starkenbach, which had been destroyed by fire. SCHALLER, *Topog. des Königreichs Böhmen*, 8vo., Prague, 1785-90, pt. xvi, p. 102. 20.

JUAN (EL MAESTRO) began 1485 the construction of the *capilla mayor* of the cathedral at Calahorra. 66.

JUAN (FRA). The common name of Francisco ASCONDO. 66.

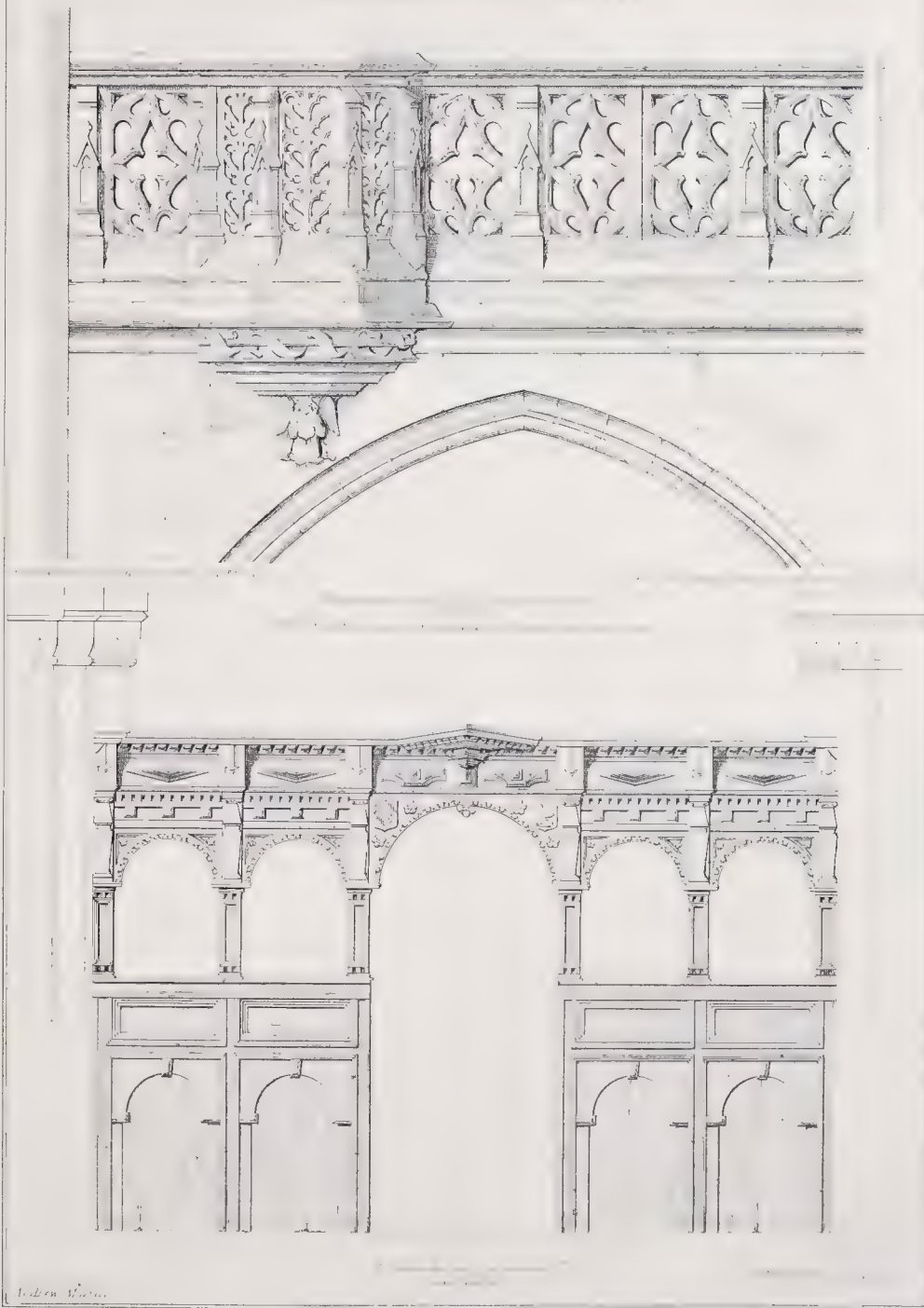
JUAN DE LA VITTORIA (SAN), in Peru, see HUAMANGA.

JUAN BAUTISTA, see TOLEDO (J. B. DE).

JUANPORE, in India, see JAUNPORE.

JUBE. A name applied to a choir or chancel screen in church (called a *rood screen* in England), the origin of which is involved in considerable obscurity. The loft or gallery on the top of this screen is called the jubé gallery, or rood loft. VIOLETT LE DUC, *Dict.*, defines jubé, s. m. *Ambon, lectrier, doxale, pupitre*, and says shortly after "Prudence rapporte que l'évêque instruisait le peuple du haut du jubé", and cites as his authority the hymn of S. Hippolytus. This is the eleventh hymn in the Peristephanon, but the only passage referring to the preaching of a bishop, is as follows:—

QUEL AND CHANCEL SCREEN





"Fronte sub adversa gradibus sublimis tribunal
Tollitur, antistes prædicat unde Deum"—lines 225-6,

it contains no mention whatever of the 'jubé'; PRUDENTIUS simply states that a high tribunal or pulpit was placed near the altar steps, from which the bishop preached. But though VIOLLET defines the jubé as an ambo, lectern, or pulpit, he elsewhere in the article *Chœur*, iii, pp. 230-32, describes the choirs of Notre Dame and S. Denis at Paris, as entered by a jubé of stone.

DURANDUS and DU CANGE do not mention the word *jubé*. Its derivation is generally supposed, and with great probability, to be from the words used in the breviary services, "Jube domne benedicere". AMBO. Tradition says these words were always read from the top of the rood loft. Some churches have simple screens without any gallery or passage across the top; others have these passages, and small winding staircases for ascent to them. As the breviary services are never chanted except where there is a monastic fraternity or *collegium* of clergy, it is probable that where there is no such gallery the church was entirely in the hands of the parochial clergy, while the existence of such gallery or passage would lead to the supposition of some fraternity being attached to the church. If this supposition be correct, the latter would be properly called the *jubé*, and the screen, the ROOD LOFT.

A. A.

"A screen in front of the altar was added in the thirteenth century, and this addition was multiplied in the two following centuries (SCHAYES, *L'Arch. en Belgique*, 8vo., Bruxelles, [1850-3] iii, 126). It was used for reading the Epistles, Gospel, certain lessons, letters of communion, edicts of bishops, and acts of council, and in some places for the benediction of the bishop, whence its name of *jubé*. At Clugny, the laity were communicated at the rood loft through a grille. The jubé took the place of the AMBO and LECTERN of the basilica, and was used for reading of the gospel and epistle, and at a later date for the organ and singers."

The jubé at Saint Amand, near Tournai in Flanders, is singular. It consists of many columns not placed in parallel lines, the shafts are of unequal heights, carrying segmental arches, above which is an organ of good design: the church was built in 1621 by Nicolas Dubois, abbot, who died 1673, aged 84 years; BLONDEL, *Cours*, 8vo., Paris, 1777, iii, 385. In 1587 the chapter at Bourg, as stated in their records, considered how to build the "jubilé en l'église Notre Dame, au chœur d'icelle le jubilé serait dressé et parfait comme celluy de Brouz." In 1768 it was taken down to improve the perspective appearance of the building, and to show the ceremonies at the altar: this is the reason why jubés are so seldom found existing, especially in parish churches; BAUX, *Bourg*, 8vo., Bourg, 1849, p. 127, 173. The jubé of Notre Dame de Brou is one of the richest examples of the sixteenth century.

The jubé in the church of S. Etienne du Mont at Paris is regarded as a *chef d'œuvre* of its time 1600; SAUVAL, *Histoire*, fol., Paris, 1724, i, 407, records its execution by Pierre BIART; and iii, 43, by Maître Clement. That at Dixmude is shown slightly in STAPPAERTS, *Belgique Monumentale*, 8vo., Brux., 1840, i, 120. At Lambadère, one of wood (Flamboyant), is given in DU SOMMERARD, *Les Arts, etc., Album*, fol., Paris, 1838-46, ser. 7, pl. iv. At Flavigny, a gallery with a pulpit over a stone arch across the nave (Late Pointed), in GAILLHAUD, *Arch. du Vme siècle*, 4to., Paris, 1854, has been given in *Illustrations*, s. v. Jubé. A complete example exists in the church of S. Fiacre, at Faouet in Bretagne; many others will be found in RAMÉE and CHAPUY, *Moyen Age Monumentale*, etc., fol., Paris, 1840-4.

"The rood screen took its origin in the necessity of protecting the monks from the draughts of cold air. As a compensation to the laity for their exclusion, two kinds of screens were introduced: 1, the choir screen, to which an altar was placed on either side of the entrance from the nave, as at Chichester, Exeter, and S. David's; 11, the nave screen, to which was a

central altar forming the matin altar, and high altar, for the laity, set between two doors in the screen, as in S. Cuthbert's chapel at S. Alban's. At Gilden-Morden, Cambridgeshire, there is a double rood screen forming two pews about 6 ft. square on each side of the door (LYSONS, *Britannia*, fol., London, 1808, ii, 59). At S. Alban's a loft was used as a dormitory for twelve monks. At Canterbury the rood stood over the choir screen, but at S. Alban's over the presbytery screen, a piece of furniture forming the original of altar rails, which is still found at S. David's. At Christchurch, Hampshire, the screen stood in the first compartment of the nave westward of the lantern, as at Tintern, Fountains, and Winchester: in the second bay westward of the lantern, at Buildwas and Norwich: in the third bay, at Westminster and S. Alban's: in the fourth bay at Jorevalle: and in the sixth bay at Tynemouth"; WALCOTT, *Church Arrangement*, in *Transactions of the Royal Institute of British Architects*, 1860-1, p. 57. PARCLOUSE; SCREEN. THIERS, *Diss. ecclésiastiques; Les jubés des églises*, 12mo., Paris, 1688.

JUBEIL, in Phœnicia. The modern name of BYBLUS.

JUFFER. An obsolete term for a small stick of hewn timber from 4 to 6 ins. square, and of any length. It is now called a Norway QUARTER or BALK.

4.

JUGERUM. A Roman measure of surface, containing 28,800 square Roman feet. ACTUS; ARIPENNIS.

JUGGANATH or JUGGERNAUTH (TEMPLE TO), see PURI.

JUGLANS, the Walnut. A tree of the natural order of apetalous exogenous plants, which grows to a large size, and affords valuable timber, as well as a pleasing addition to the cultivated grounds of a country residence, with the chestnut, etc.

JUGLANS REGIA, the royal or common walnut, is a native of Persia and the north of China. The wood is hard, of a dark greyish brown colour with black brown pores, and often much veined with darker shades of the same colour; the sapwood is greyish white. Before the introduction of mahogany it was much used for cabinet work; and is still largely imported from Russia and Germany, chiefly for gun stocks. An inferior kind, used in France for furniture and frames of machinery, is less brown than the fine sort.

JUGLANS SIGRA, black Virginia walnut, is a native of America, being found from Pennsylvania to Florida. It is a tree of remarkable size and beauty; the wood finely veined, turning dark in colour after having been cut, and of a fine grain; it is the most valuable of the American sorts for cabinet work. This wood, which is rather scarce, is lighter than oak, and stronger than cedar, and almost as durable as either. It must be freed from the sap, which is soft and rapidly decays.

The white walnut, or Butternut wood, or Hickory, is the *Juglans cinerea*, or *Carya alba*, and used for furniture.

JUGLANS AMARA, Bitter nut hickory, is inferior to the other varieties; all of them are poorly adapted for timber in building; they are strong, elastic, and tenacious, but soon decay and become worm eaten. HOLTZAPFEL, *Woods*, etc., 8vo., Lond., 1843. 14. 71.

JULBE or XULBE (PASCASIO DE), was *maestro mayor* 1416 of the church of Tortosa; his son Juan conducted the works for him. They were both members of the select committee for settling the disputes with regard to the proposed plan for the cathedral at Gerona, then in course of construction by G. BOFFIY.

66.

JULIANUS ASCALONITES, see ASCALON (J. OF).

JULII FORUM. The Roman name of FRÉJUS, in France.

JULIOMAGUS. The Roman name of ANGERS, in France.

JULIO ROMANO, see PIPPI (GUILIO).

JULIUS (. . .) was living before 1355, at Spandau in Prussia, where the *Julius-thurm* in the fortress is said to be his work.

68.

JULIUS CÆSAR (CAIUS). One of the temples to this deified ruler is mentioned as the *templum Cæsaris* by PLINY, *H. N.*, xxxv, 10; and in two places as the *ædes Divi Julii* in the MONUMENTUM ANCYRANUM; this is the "*Divi Julii*" of VITRUVIUS, iii, 2, of which the precise locality at Rome is not known. CÆSAREUM.

JULIUS LACER (CAIUS) has usually been supposed to have been an architect, and to have erected A.D. 103, for the

emperor Trajan, the bridge at ALCANTARA in Spain. A structure at the foot of the bridge has been called a sacellum or chapel, or his tomb; but it was destroyed, and the bridge itself pulled down, as stated in the *ATHENÆUM Journal*, for 24 July 1858. A description of it and of the triumphal arch thereon, with the dedicatory inscription, is given in MONTFAUCON, *Antiq.*; and in QUATREMÈRE DE QUINCY, *Diet.*, s.v. Alcantara, which differs from that in GRUTER, *Inscr. Ant.*, fol., Amst., 1707, i, 162. There is, however, nothing in the inscription to indicate that Lacer was an architect; he seems rather (like several of the later builders of bridges in Spain) to have been a priest; the words "fecit divina nobilis arte Lacer" seem to have been misunderstood, for "ars divina", like the first words in VITRUVIUS, "cum divina tua mens", do not indicate building operations.

JULIUS POSPHORUS (CAIUS) is only known by an inscription "C. Julio Luciferi filio Posphoro architect. Aug. Claudia Stratonice uxor viro optimo", given in GRUTER, *Inscr. Ant.*, fol., Amst., 1707, p. 591.

JULIUS RUFUS (CAIUS) is adduced by REVER, *Ruines du Viel Evreux*, 8vo., Evreux, 1827, p. 206, as an instance of a Gaul who had studied architecture under the Romans, because his name, with that of his father Ottuanius, of his grandfather Gedomon, and of his great-grandfather Epotsorovidus, appears in an inscription on the pont des Sautonnes over the Charente: as the text is not given, it is difficult to decide the occupation of this person.

JULLIEN (. . . .), as architect of the department du Cher, in France, designed 1832-6 the halle aux blés at Bourges; the first stone was laid 29 June 1832 by the duke of Orléans. It cost 360,000 fr. for the edifice, and 100,000 fr. for the site. GOURLIER, etc., *Choix d'édifices*, fol., Paris, 1825-36, ii, pl. 214, p. 24.

JULLIET. The keep in a large castle was generally a high square tower; if instead of being a square, the keep or dungeon happened to be round, it was called a julliet (AGARD, in HEARNE, *Coll. of Discourses*, 8vo., London, 1775, i, 187) from a vulgar opinion that large round towers were built by Julius Cæsar (GROSE, *Antiq.*, 4to., London, 1773, i, p. 7); as at Tutbury, Cambridge, Warwick, and in the Tower of London, although the latter is square, and is called by some 'the cradle'; CLARKE, *Vestigia Anglicana*, 8vo., London, 1826, i, 236.

JUMP. A term given to a sudden rise in foundations, due either to an alteration in the character of strata of the ground, or to a change of level. Instead of making abrupt jumps, it is better to let the brickwork rise gradually in step courses. This operation is called 'raking back'.

JUMP. The method of making a deep hole in a stone, by one workman holding a long iron bar with a steeled chisel end, which he turns round and round slowly, while another workman strikes the end with a heavy hammer or mallet. It is chiefly used in blasting operations in mines.

In Devonshire, one man works his jumper alone, single handed; the weight of the bar let fall does its own work. A ball is worked on the lower part of the rod to add to its weight.

JUMPER. The bar or chisel used for the purposes of jumping as above described.

JUNI (JUAN DE) was a native of the Netherlands, and a pupil of Michael Angelo. He practised chiefly in Spain and Portugal, from 1545 to the beginning of the seventeenth century, constructing first his own house in the Campo Grande at Valladolid, besides executing several *retablos* as a sculptor. He went to Oporto, where he constructed the episcopal palace for the bishop Don Pedro Alvarez, described in BERMUDEZ, and in PALOMINO, *Vidas de los pintores*, fol., Madrid, 1715-24. He died about 1614; FIORILLO, iv, 134.

JUNIPERUS. A numerous class of dicotyledonous trees much used in building operations, under the name of cedar wood. The varieties existing in England, where it was intro-

duced before 1664, are the common, and the Swedish, juniper; both of which do not grow to any great height, and the woods are only employed for turning and similar operations, on account of their small scantling and the danger of their splitting. The Lycian variety is rather common in Spain, and in the islands of the Mediterranean, where it is worked into joists and other carpenter's work.

O. R. B.

Owing to the strong scent of this wood, it has the property of keeping off all kinds of insects and vermin, and is therefore well adapted for skirting boards to bedrooms, linings to cupboards, seats of water closets, floors of barns and warehouses, for storing grain, and for fittings to shops where fur, blankets, or woollen goods are kept. It should not be used for making cabinets for medals, etc. (*BUILDER Journal*, xi, 76), or anything for holding steel goods.

In the description of a great fire which occurred at Copenhagen in 1689, a building is said to have been "profusely ornamented with carving or juniper work" (*LONDON GAZETTE*).

Pencil cedar is said to be "as strong as oak in pressure and when weighted". According to some writers its strength is two-thirds of oak. The cohesive force of cedar is 4875 lbs. per square inch according to Muschenbroeck, who does not state, however, the sort experimented upon. ABIES; CEDAR; CEDRELA; CUPRESSUS.

JUNIPERUS VIRGINIANA, red or pencil cedar, or Virginian red cedar, is a native of North America, the West India islands, and Japan. It is capable of very long preservation under alternate states of dryness and wetness, and is much used for railroad timbers, fencing, etc. The colour of the sapwood is nearly white, that of the perfect wood is a bright brownish red; the wood is compact and fine grained, with a nearly uniform texture. Knots sometimes appear, which mar its appearance, as they are often surrounded by white spots. It is brittle and very light, its specific gravity being only 650. Specimens of the red cedar weighed 26 lbs. 10 oz. per cubic foot, and of the pencil cedar 25 lbs. 9 oz. Logs are imported from 10 to 20 ft. in length, and from 8 to 12 ins. square.

71.

STEVENSON, *Civil Engineering of North America*, 8vo., London, 1838, states that "the growth of this valuable wood is confined to the United States, where it has a diameter of 12 or 13 ins., and grows to between 40 and 50 ft. in height. It is now becoming too scarce and valuable to be used for railway sleepers. The trunk decreases so rapidly that the largest stocks rarely afford timber for ship building of more than 11 ft. in length, and its diameter is diminished by deep oblong crevices in every part of the trunk." It has been introduced into some railways in the north of England for sleepers. In America it is used extensively in ship building with live oak and locust, having the property when used with other woods of preventing their rotting. The selling price at London (1846) was 4d. to 5d. per sup. ft., to 50 per cent. higher than Memel or Dantzic oak. At Liverpool from 3d. to 4d. per sup. ft.

JUNIPERUS OXYCEDRUS, brown berried cedar, is a native of the north of Spain, the south of France, and of the Levant. It is supposed to be the cedar of the ancients, so celebrated for its durability. (CUPRESSUS.) It is still used for joists and carpenters' work.

JUNIPERUS BERNUDIANA, Bermudian cedar, a native of Bermuda and the Bahama islands, produces timber for joiners' and cabinet work, which is harder and heavier than the pencil cedar. It was formerly much used in ship building, and considered to be imperishable. It weighs 34 lbs. 15 oz. per cubic foot.

EVELYN, *Sylva*, edit. by HUNTER, 4to., London, 1825, 3rd edit.; TREDGOLD, *Carpentry*, 4to., London, 1828; HOLTZAPFEL, *Woods*, 8vo., London, 1843; SELBY, *Forest Trees*, 8vo., London, 1842; MICHAUX, *North American Sylva*, 4to., Phil., 1817.

JUNO (TEMPLE TO). The Romans identified their goddess Juno, the sister and wife of Jupiter, with the Greek Hera or Rhea. As in the case of the male deity, the epithets applied are too numerous to be noticed. Her attributes are the sceptre and the diadem; a peacock with tail displayed stands at her feet; and the lily was peculiarly sacred to her: sometimes a cuckoo occupied the top of the sceptre. A statue of a crowned

female of mature age, having a veil floating behind her and holding a sceptre and a pomegranate, may almost invariably be taken to have represented this deity.

Any temple dedicated by the Greeks to Hera or Here was called a heræum (Gr. *ἡράειον*): and this term was particularly applied to the fane situated about five miles and a half from Argos and two miles from Mycenæ, to which latter city the edifice probably belonged; but in the historical age it was under the government of Argos; and it is now very often mentioned as the heræum of Argos, whence mistakes arise, as there was one in that city, and another near its stadium and acropolis. The remains discovered 1831 by General Gordon, are those of the later temple which was erected by EUPOLEMUS, after its predecessor was burnt B.C. 423, a little below the ancient one, part of whose substructions are still visible. Portions of the strong walls of the peribolus of the temple of Hera Acraca are still visible upon a promontory (Cape S. Nicolas or Melankavi) thence called the heræum of Corinth.

Besides the above temples, there are other celebrated ones to this goddess; as at Samos, and at Girgenti; and she had several shrines and temples at Rome: the site of which is now uncertain, especially of that dedicated to Juno Moneta, the Roman mint, which occupied the site of the house of Manlius in the Arx: the dispute as to which of the two summits of the Capitoline hill was the Arx will be noticed *s.v.* JUPITER. The MONUMENTUM ANCYRANUM mentions the "ædes Minervæ et Junonis Reginæ et Jovis Libertatis in Aventino." DONALDSON, *Architectura Numismatica*, 8vo., London, 1859, gives medals, Nos. 17, 22, and 23, of temples and tabernacles to this goddess: PAUSANIAS and STRABO may be advantageously consulted in regard to the temples erected for her worship.

GIBBON, *Decline*, etc., 8vo., London, 1854 (Bohn), iv, 336, chap. xl, states that "On the Asiatic shore of the Propontis, at a small distance to the east of Chalcedon, the costly palace and gardens of Heræum were prepared for the summer palace of Justinian, and more especially of Theodora", and refers to GYLLIUS, *De Bosphoro Thracico*, l. 3, c. 11; ALEMAN, *Not. ad Anecdota*, p. 80, 81, who quoted several epigrams from the Anthology; and DU CANGE, *C. P. Christ.*, l. 4, c. 13, p. 175-6. A temple to Juno was discovered 1865 at Pompeii, in which were the skeletons of upwards of three hundred women and children enveloped in scoræ, with all the vessels, golden tripod, lamps, marble and mosaic pavements, and the statue itself with her attendant peacock, covered with jewels and precious stones.

JUPITER (TEMPLE TO). To the Zeus of the Greeks or Jupiter of the Romans, who was the chief deity of the classic world, were assigned the actions of the three hundred (according to VARRO) persons who bore one or other of these names: and later the Romans identified him with the Ammon of the Egyptians. The Oscans knew him as Lucerus or Lucusius, and the corresponding name of Juno was Lucina. The Roman name is apparently a contraction of *Dioes* or *Diovis* (forming Jovis, Jovi, Jovem, Jove), with *pater* in the nominative. His epithets are too numerous for notice. His attributes are the sceptre, and in early times a flint-stone, but later the thunderbolt; an eagle with wings expanded at his feet; and the oak was sacred to him. But at Olympia, according to PAUSANIAS, he was represented with a crown of olive, the eagle was perched on the top of the sceptre, and the mantle adorned with flowers, particularly the lily. A statue seated on a throne and nude down to the waist, may almost invariably be taken to have represented this deity. The ram was sacrificed to him; and white was his special colour.

Some notice of celebrated remains of the temples dedicated to this deity will be found *s.v.* *Ægina* (where he was called Panhellenius); Aizani; Athens, p. 115 (called Olympius); Foligno (Clitumnus); Girgenti (Olympius); Olympia; San Giorgio (Nemæus); Selinus; and Spalato.

Several temples at Rome were dedicated to Jupiter, but their

sites have become matter for conjecture. The most important was on the Capitoline hill; this hill had two summits with a space between them called the intermontium: thus VITRUVIUS, iv, 7, speaks of a fane of Veiovis 'inter duos lucos'; and the same fane is mentioned in the following words 'est autem etiam ædes Vejovis Romæ inter arcem et capitolium' by GELLIUS, *Noct. Attic.*, v, 12. A temple to Jupiter Custos is also said to have been erected in the intermontium. The MONUMENTUM ANCYRANUM mentions the "ædes in Capitolio Jovis Feretrii et Jovis Tonantis", and also an "ædes . . . Jovis Libertatis in Aventino": the ædes Feretrii may have been the Vejovis; but it may have been known as the ædes Custodis because it was only a small shrine in which the *spolia optima* were deposited; DION. HAL., ii, says that its longest side measured only fifteen feet; CANINA supposed it to have been a *sacellum* at the back of the temple of Jupiter Capitolinus. The site of the ædes Tonantis will be hereafter noticed. The temple to Jupiter Maximus or Capitolinus stood on the northern or lesser top according to CANINA, BRAUN, and DYER; but BUNSEN and BECKER both suppose that it was situated upon the southern top; the position of the arx, which occupied one of these sites, is therefore still undecided. The arguments on both sides are condensed by ASHPITEL, *On the different Theories respecting the Forum at Rome*, read 20 April 1857 at the Royal Institute of British Architects, p. 126, who considers that the church called the Ara Celi represents the temple to Jupiter Optimus Maximus.

There has also been a controversy respecting the three columns which stand in a line near the south corner of the forum: the author just cited observes in the same paper that these which were for a long time, and are still popularly, called columns of the temple to Jupiter Stator, cannot have belonged to that structure, as it was close to, if not within, the Palatine gates; POGGIO supposed them to be part of the bridge of Caligula; NARDINI considered them part of the Comitium; NIBBY called them part of the Græcostasis; BUNSEN claimed them for a temple to Minerva Chalcidica built by Augustus in connection with the Curia Julia; and CANINA pronounced that they were part of that Curia: but it would appear from TAYLOR, *Ancient Roman and Etruscan Architecture*, read 24 January 1859, p. 53, at the Royal Institute of British Architects, that the discovery of the pavement, which is recognised as marking the frontage of the basilica Julia, authorizes the idea expressed by BECKER and DYER, viz. that the three columns belonged to the temple to the Dioscuri, which was octastyle in front, as determined by the dimensions of the remains. This seems to be corroborated by the MONUMENTUM ANCYRANUM, which says "curiam et continens ei chalcidicum"—"forum Julium et basilicam quæ fecit inter ædem Castoris et ædem Saturni": but if CANINA rightly held that the curia was the octastyle building and adjacent to the basilica, and that both faced the forum, little room would be left on that side for the temple to Castor and Pollux.

With regard to the three columns which formed an angle of a building at the western corner of the forum there has been a similar dispute: this structure was for a long time, and popularly is still, called the temple to Jupiter Tonans; by BUNSEN and BECKER it was assigned to Saturn; but it is the temple to Vespasian according to CANINA and DYER, as admitted by BURGESS, *Topog. of the Roman Forum*, read 28 June 1852 at the Royal Institute of British Architects. The site of the temple to Jupiter Tonans is placed by CANINA directly south of the triangular piece of ground dedicated to the Dii Consentes, which, in his opinion, abutted on the western angle of the forum. This temple clearly was placed on the *clivus* of the capitol; SUTTONIUS, in *v. Aug.*, notices that Augustus hung bells upon it, and called it the *janitor* of the Capitoline building. DONALDSON, *Architectura Numismatica*, 8vo., London, 1859, gives, No. 8, a medal of a temple to Jupiter Ultor with a magnificent court or peribolus; No. 19, the medal of

the six-columned temple to Jupiter Sol at Emesa on the Syrian coast; Nos. 34 and 35, of the temple of the same god at Baalbec (Heliopolis); and No. 36, of a temple at Zeugma. PAUSANIAS enumerates numerous temples, altars, porticos, and other fanes, which existed in his time in honour of Zeus, as does also STRABO.

On the summit of Mount Juktas, near Arkhanes in the island of Crete, is the so-called tomb of Zeus. On the northern extremity are the foundations of the massive walls of a building, the length of which was about 80 ft. Within this space is an aperture in the ground leading to a cave now only about 8 or 10 ft. diameter, and so low that a man cannot stand upright in it. This tomb, with its celebrated inscription, was an object of deep religious veneration. 28.

EMERIC-DAVID, *Jupiter; Recherches sur ce Dieu, etc.*, 8vo., Paris, 1833; QUATREMÈRE DE QUINCY, *Le Jupiter Olympien; ou l'art de la Sculpture Antique*, fol., Paris, 1815.

JUPP (RICHARD) exhibited 1762 and 1763 designs at the Society of Artists of Great Britain; 1778 at the Academy of Arts, "the principal front of the villa in the gardens at Pains Hill"; and 1798 a design for the new front of the East India house, Leadenhall-street (lately pulled down), and the sculpture in the tympanum, of which latter work (executed by Bacon) he published a plate and description. As surveyor to the East India company, he made the designs for rebuilding the "House", but the façade was eventually carried out 1799-1800 from a design by H. Holland, who succeeded to that office upon the death of Jupp 17 April 1799, at his house in King's-road, Bedford-row. The warehouses for this company which Jupp may have designed, if any, are not recorded. Jupp was one of the eleven original members of the Architects' Club, founded 1791. He also designed 1784 Severndroog castle, near Eltham, Kent, for Lady James, to commemorate the achievements of Sir Walter James in India (HASSELL, *Views*, 4to., London, 1804).

JUPP (WILLIAM), brother of the above, and father of R. W. Jupp, late clerk to the Carpenters' Company, and grandfather of E. B. Jupp, the present clerk, resided in New Ormond-street. The entrance hall and principal staircase leading to the court rooms of Carpenters' hall, London-wall, were erected about 1780 from his designs: the entrance hall is decorated in stucco work with emblematical figures and implements used in carpentry, curiously and prettily grouped, and with heads of Vitruvius, Palladio, Inigo Jones, and Wren, executed by Bacon: the archway forming the entrance from the street was also designed by W. Jupp; on the keystone is a fine bust of Inigo Jones, likewise the work of Bacon; JUPP, *Carpenters' Company*, 8vo., London, 1848, p. 233. He also designed the London Tavern, Bishopsgate-street Within, after the fire in that locality Nov. 1765; and died in 1788.

JUPP (WILLIAM), son of William, resided in Hatton-garden. He exhibited various designs at the Academy of Arts, in 1794-95-96 and 97; and in 1800 "the India House"; 1801 a theatre; 1803 "design for a room at the Star and Garter"; and 1804 "a public building". In 1808 he designed the façade of Skinners' hall, Dowgate-hill, being architect and surveyor to that company, as well as to that of the Merchant Tailors, and the Ironmongers; and was also district surveyor for Limehouse, Blackwall, Wapping, Mile End Old Town, Poplar, and Ratcliff. He died in 1839.

JURA LIMESTONE. A breccia, not used in Paris until about 1857 or later. In the Exhibition of 1862, M. P. de Tinséan, of Saint Ylie, Jura, showed besides a column, a polished slab about 16 ft. in length, and three portions of balustradings similar to those on the pont au Change, de Solferino, and the new pont Louis Philippe, all at Paris; the two last were designed by Savarin, and the first by Vaudrey. The varieties exhibited were of a yellow and a red tint. BULDER *Journal*, xviii. 309, 573; and xx, 597. The parapet of the wall of the quay de l'Horloge, to the north of the palais de justice,

at Paris, is built (1860) of Jura limestone, which receives a high polish equal to that of marble.

JURISPRUDENCE (ARCHITECTURAL). The study and application of law to questions connected with building operations. In all civilized societies, where there are great, inter-mixed, and contending interests, there will arise differences of opinion, controversies, and collisions, which can only be settled by the intervention of law. As this science requires the study and labour of a life, and the exercise of peculiar faculties of high order; and, as is also the case in medical matters, any error may be attended with the most serious results, the architect will do wisely never to attempt to assume the position of, or to act as, a lawyer. As, however, many things occur every day to the architect wherein a practical knowledge of that, which is permitted or forbidden; of that, which custom sanctions or prohibits; the meaning or interpretation of certain technical phrases; and the course to be pursued when there is a difference of opinion thereon; the extent to which certain words are binding in contracts and agreements, the acts to be done to carry the same equitably into effect, and the assessment of the sums to be paid for the same; all these are matters, the great principles of which should be known to every architect, and which are treated of in this work under their several heads, and only necessitate a short referential epitome.

The great subject of arrangement of differences by a skilled person chosen by the contending parties; ARBITRATOR; AWARD; REFERENCE; and UMPIRE.

The regulations of buildings as to the safety of the public, either by accident or danger by fire; BUILDING LAWS; OWNER, building and adjoining; WALL, party, external, cross, or divisional; FOOTING; CHIMNEY; HEARTH; TRIMMER; PARAPET; CHASE; CORBEL; PIPE; STAIR to public buildings; PARTY ARCH; PUBLIC WAY; PUBLIC BUILDING; PROJECTION; SEPARATION of buildings; OPEN SPACE; YARD; WAREHOUSE; also DISTRICT SURVEYOR.

The making and carrying out of a contract; CONTRACTOR; ESTIMATE; EXTRA WORK; MEASUREMENT; OMISSION; PENALTY; PROVISION; QUANTITIES; SPECIFICATION; SCHEDULE of prices; TENDER.

The assessment of the value of land or other property taken under the powers of Acts of Parliament; COMPENSATION; COMPULSORY SALE; APPORTIONMENT; ARBITRATION; AWARD; UMPIRE; VALUATION.

The rights and customs as to lands and tenements occupied but not freehold, COPYHOLD; ENFRANCHISEMENT; LANDLORD AND TENANT; LEASEHOLD; GROUND RENT; RENT, fee farm, rack-rent, apportionment of rent; DILAPIDATION, civil and ecclesiastical; WASTE; FIXTURES, domestic and trade.

For the rights and privileges over, across, or derived from the property of another; EASEMENT, affirmative, negative, continuous, discontinuous, apparent, non-apparent; LIGHT AND AIR; WATER; Water course; Way, right of; SUPPORT, right of; Trade, carrying on noisome or offensive.

For things connected with public health or sanitary matters; DRAINS, barrel, box, pipe; GLAZE; SOCKET; TRAP, syphon; BELL TRAP; GULLY HOLE; CESSPOOL; SEWER; ABSORBING WELL; PRIVY; WATER CLOSET; CISTERN; TANK; D TRAP; SOIL PIPE; PAN; VALVE BOX; SEAT AND RISER; DUST-BIN; SCAVENGER; ABATTOIR; SLAUGHTER-HOUSE; NUISANCE; BATHS AND WASHHOUSES; STREETS, width of, and paving of; UNDERGROUND ROOM; VAULT. A. A.

ELMES, *Practical Treatise on Architectural Jurisprudence, in which the Constitution, Canons, Laws, and Customs relating to the Art of Building are collected from the best Authorities, for the use of Architects, Surveyors, Landlords, Tenants, etc.*, 8vo., London, 1827.

ADDISON, *Treatise on Law of Contracts, and Rights and Liabilities, ex Contractu*, 8vo., 1856; AMOS and FERARD, *Treatise on the Law of Fixtures*, 2d ed., 8vo., 1847; BARTHOLOMEW, *Specifications for Practical Architecture, etc.*, 8vo., 1846;

BRUTON, *Ecclesiastical Dilapidations; a few words on the Law thereof*, 8vo., 1865, 2nd edit.; CASWALL, *Law of Copyhold and Copyhold Enfranchisement*, with late Act of 4 and 5 Vict. c. 35, 3rd edit., 12mo., 1849; CHAMBERS and TATTERSALL, *Law relating to Buildings, comprising the Building Act, Fixtures, Insurance, Actions on Builders' Bills, Dilapidations, etc.*, 12mo., London, 1845; CHITTY, *Treatise on the Law of Contracts*, 8vo., 1857; DEAN, *Enfranchisement, and Commutation of Copyhold Property considered, etc., with the Copyhold Enfranchisement Bill*, 8vo., 1851; DONALDSON, *Handbook of Specifications*; with GLEN, *Review of the Law of Contracts*, 8vo., 1860; GIBBONS, *Law of Fixtures*, 8vo., 1836; GIBBONS, *Law of Contracts for Works and Services*, 12mo., 1850; GIBBONS, *Law of Dilapidations and Nuisances*, 8vo., 1849; MORRIS, *Discourse upon Dilapidations*, 12mo., 1855; ROYAL INSTITUTE OF BRITISH ARCHITECTS, *Report on Dilapidations*, 8vo., 1844; RYDE, *General Textbook for the constant Use and Reference of Architects, etc.*, 8vo., 1854; SCRATCHLEY, *Copyhold, Life Leasehold, and Church Property*, 4th edit., 8vo., 1859; SCRIVEN, *On Copyhold, Customary Freehold, and Ancient Demesne Tenure; Courts, etc.*, 4th edit. by H. Stalman, 8vo., 1846; SMITH, *Law of Landlord and Tenant*, 8vo., 1860; SMITH, *Law of Contracts*, 8vo., 1855; WATSON, *Treatise on the Law of Arbitration and Awards*, 8vo., 1846; WOODFALL, *Practical Treatise on the Law of Landlord and Tenant*, 8vo., 1856; WOOLRYCH, *Treatise on the Law of Window Lights*, 12mo., 1833; WOOLRYCH, *Law of Party Walls and Fences, with Building Act*, 8vo., 1845; YOOE, *Essay on Waste, Nuisance, and Trespass*, 8vo., 1863.

Metropolitan Buildings Act, see BUILDING LAWS; Metropolitan Local Management Acts, 18 and 19 Vict. c. 120, 1855; 19 and 20 Vict. c. 112, 1856; 21 and 22 Vict. c. 104, 1858, and Amendment Act, 1862; Nuisances Removal and Disease Prevention Act, 18 and 19 Vict. c. 121, and Amendment Act, 23 and 24 Vict. c. 77; recent Legislative Acts applying to Contractors, etc.; Copyright Act; and Copyright of Designs Act, 1858, 21 and 22 Vict. c. 70.

JUSSOW (HEINRICH CHRISTOPH), son of an *oberbaumeister*, was born 1754 at Cassel, in Hesse. He first studied at the Caroline college at Cassel, and afterwards at Marburg and Göttingen. Turning his attention to architecture, on the death of his father he obtained a subordinate situation, and attracted the notice of the landgrave Friedrich, who sent him to Paris, where he stayed two years, and then left for Italy; having visited Rome, Naples, Pastum, etc., and the ancient cities in Sicily, he returned through Trieste, Vienna, and Dresden, to Cassel. After a very short stay, he was sent by the landgrave Wilhelm IX to England, to study the architecture of that country. He returned about 1790, and was immediately appointed successor to the *oberbaumeister* Du Ry, and directed to conduct the building of the ducal castle of Wilhelmshöhe, one of the wings of which had been already constructed by his predecessor. The pleasure grounds in the park were laid out from his plans. In 1793 he conducted the building of the Löwenburg, which became a complete Gothic Ritterburg. The great water works, the conservatories, and the pavilion, were all designed by him; and he restored the octagon on the Carlsberg, built 1701-15 by Guernieri, which was decaying. By order of king Friedrich II of Prussia he designed the monument for the Hessians who fell at Frankfort.

After completing the works at Wilhelmshöhe, he was appointed *ober-kammer-rath*, and presided at the boards of architecture, roads, and bridges. He directed many restorations of the ducal residences; and built the barracks, and the Neustädter church. On the creation of the kingdom of Westphalia, he was employed partly as superintendent of the royal buildings, and partly as inspector-general of roads and bridges. About that time he constructed the great *marshall*, and the Chinese gallery at Wilhelmshöhe; and the *messhaus* at Cassel. On the return of the elector, he was created knight of the order

of the Lion, and on the day the foundations of a new ducal residence after his design were laid, he received the cross of commander. These works were, however, interrupted by the death of the duke. He subsequently designed the barracks and the Friedrichs-thor. He died in 1825. *Der Neuer Nekrolog der Deutschen*, 8vo., Ilmenau, 1827, iii, pt. 2, p. 841, contains a full biographical memoir of him.

JUSTICE (COURT OF). A building for this purpose in ancient Rome was called a BASILICA. The court of justice of the present day consists either of a magistrate's court, a county court, a police court, or one of the many courts of LAW. See LAW COURTS.

JUSTICE (TEMPLE TO). MILIZIA, *Memorie*, 8vo., Parma, 1781, i, p. 18, in the life of Pteras, mentions "a grandiose and magnificent temple of Justice in Rome, which surprised every one by its ceiling of brass"; but no such temple has been mentioned by any ancient author, or by the regionaries. The same author, p. 75, considers the basilica as a palace of Justice, and probably may have confused the word with that of temple. The only building at Rome of which any especial mention is made as having a celebrated ceiling of bronze, is one mentioned by SPARTIAN as commenced by Antoninus Caracalla, and which he calls the "cellam solearem" (*sub. vit.*); he describes it as ceiled with lattice work of brass or copper, "ex ære vel cupro cancelli super-posita", and that the span of the same was so great as to surprise the most skilled mechanic. It is true that many domes and coffered ceilings were adorned with bronze, like that of the Pantheon; but "cancelli" or lattice work can only be explained as CANINA has done, as a flat ceiling with perforations for ventilation.

The Greek goddess of Justice, THEMIS, seems to have had several altars, sanctuaries, and shrines, but probably no very important temple.

JUT-OUT (Fr. *jetter*). Anything projecting before the face of the work of which it forms a part, is said to jut beyond it.

JUTTY, or jettie; getee; and getteiz (1373). A term applicable to the projecting or overhanging stories of timber-built houses. It is employed in NORMANUS, *Fulgaria*, 4to., London, 1519, p. 246, in the translation of the Latin phrase, "Mœniana ædificia vetustate corrupta periculo sunt obnoxia", as "Byldynge chargydde with iotyes is parellous whā it is very olde." STREUVENS cites an agreement between Henslowe and others for the construction of a theatre with "a juttye forwards in cyther of the two upper stories."

JUVARA, also written Giovara, Giuvara, Guevara, Ivvara, Ivvara (ZANI), Juara, Jubara, Suara, and Yuvara (Cavaliere DON GIOVANNI, or FILIPPO, or DON DOMENICO FILIPPO according to ZANI, but FILIPPO according to most authors). He was born 1685 at Messina, where one of his brothers was a worker in silver, whose figures were esteemed in France and England. ZANI mentions a brother Francesco, with the dates 1690-1793; and also states that a Filippo Ivvara, *sacerdote*, was born at Parma 1684, and died 1735, this is apparently the same as Juvara; and TICCOZZI notes that Filippo Juvara was born at Parma 1674, and engraved some *cartocci*; this may be a different family. Pedro de IBARRA was of previous dates.

Having early attained proficiency in drawing, he took the ecclesiastical habit and went to Rome, where he studied under Carlo Fontana, supported himself by engraving, and amongst other subjects (the *Raccolta di vario targe* is dated 1715) he published the scenery designed by him for cardinal Ottoboni's theatre of the Burattini.

His career of architectural practice commenced by a commission from the duke Vittorio Amadeo II of Savoy as king of Sicily (1713-20) to erect a palace in the environs of Messina; this work resulted in his appointment as chief architect, with an annual salary of 600 crowns. His patron as king of Sardinia (1719-20) took him to Turin, where the abbey of Selve, worth 1,100 scudi a year, was given to Juvara, who then built the façade

of the church of the Carmelites in the piazza di S. Carlo at Turin; the church of the Blessed Virgin on the Monte di Superga, with its dependent buildings; the capella di Corte, the coach-house, the gallery, and the orangery, at the reale casa del Campo, called La Veneria Reale (a hunting box, no longer existing); the church of the B. Virgine del Carmine; and an interior staircase in the palace. He planned the summer hunting palace at Stupinigi with its splendid theatre, spacious stabling, kennels, etc.; the superb staircase to the castle, but out of character with the rooms to which it conducted; and gave the model for the new church of the Padri dell' Oratorio.

During these engagements, Juvara went every winter to Rome, where he made a model (still preserved) for the sacristy and deanery of S. Peter's, and many drawings which have been considered masterpieces of workmanship with bad materials. He was sent at the request of the king of Portugal to Lisbon (RACZYNSKI seems to say before 1717), where he made a design for the monastery and palace of John V at Mafra; this was not accepted, but he returned to Turin with the title of cavaliere di Cristo, a pension of 3,000 scudi, a diamond star, jewels, etc. Having first visited London and Paris, he was sent from Turin to finish the cupola of the church by L. B. Alberti, of S. Andrea at Mantua; 1732 that of the cathedral at Como; the very high campanile to the cathedral of S. Martino at Belluno; and the façade of the church of S. Ambrogio or the cathedral, at Milan. He erected few private buildings, but the palazzo Birago di Borghe or di Borgaro at Turin has been praised.

STEFANI E MONDO, *Turino*, etc., 8vo., Turin, 1852, pp. 289-292, name the following buildings, also in that city, as by Juvara:—"the palazzo Madama; the casa dei missionarii and church, now the palazzo arcivescovile; the front of the palazzo Guarene; the palazzo Martini di Cigala (ascribed to him);

1725-9, the palazzo del Seminario; the façade of the palazzo del Senato (altered by Alfieri); the church of Sta. Croce; the façade of the church of Sta. Cristina; 1714, the altar and alterations of S. Andrea called La Consolata; 1718, embellishments of Vittozzi's church of La Trinità with Sicilian marbles; the high altar in the church of SS. Martiri; 1700, the two barracks of the porta Susina, considered then the best in Europe; 1716, the porticoes of the piazza delle Frette, now the piazza Emanuel Filiberto; the church of S. Filippo Neri, after the fall 26 Oct. 1715 of Guarini's work; the first left hand chapel in S. Francesco di Paolo; and 1725, the chapel of S. Giuseppe in Sta. Fosca;" with the castles at Sovone and at Rivoli.

Philip V invited Juvara to Aranjuez, as his architect, where he designed the centre portion of the garden front of the palace at S. Ildefonso; and made an immense model preserved in the artillery museum, for the new royal palace at Madrid, to be 1,700 ft. square, 100 ft. high, with a courtyard 700 ft. by 400 ft. (the old palace was burnt 1734). He died 31 January 1736, and was buried in the parish church of S. Martin at Madrid, having recommended his pupil G. B. Sacchetti, to carry out the work, who substituted a design of his own invention, afterwards modified by F. Sabbatini 1760-93. ZANI calls Juvara "canonico di S. Ildefonso". L. Vanvitelli studied under him.

Many of his designs are published in VOIT, GUHL, and CASPAR, *Denkmäler der Kunst*, fol., Stuttgart, 1845; being the plates to KUGLER, *Handbuch der Kunst Geschichte*, new edit., 8vo., Stuttgart, 1848; NAGLER says s. n. that count Baroni di Tavigliano published 1738 twenty plates of the church of S. Filippo Neri; and that some of his compositions were published 1779 by Ch. ab Aqua and Berardi. MAFFEI, *Elogio del S. ab. F. Icara*, in *Delle Osservazioni Letterarie*, iii, 193; CAVEDA, *Essayo Historico—de Architectura*, 8vo., Madrid, 1848.

3. 25. 65. 66. 116.

JYMEWE. A hinge; see JEWMEW.

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KAKO

KABAH or **КАНБАХ**. The name of some ruins occupying a site of about a mile square, situated near Ticul in Yucatan. They comprise mainly three buildings and two or three large piles of stone of a pyramidal form, somewhat similar to those at CHICHEN. They are described in NORMAN, *Rambles, etc.*, 8vo., New York, 1843, p. 148-50; and CATHERWOOD, *Yucatan*, fol., London, 1844, who gives a view of the city, and the interior of the principal building, consisting of two parallel chambers, one 127 ft. long and 10 ft. 6 ins. wide, the other a little less in width and raised two steps, the lower one formed into "a scroll, one of the most appropriate designs to be met with in Yucatan"; this view is also given in GAILHABAUD, *Mons. Anciens et Modernes*, 4to., Paris, 1850, pl. at end of vol. iv.

KAGE or **CAGE**. An old term applied to chantry chapels enclosed with lattices or screen work, as "S. Mary's and S. Nicholas' kage", in Whalley church, Lincolnshire, the screens of which were carved by Etough, carver to Whalley abbey in 1510. In the same church it appears that the pew belonging to the Townley family, in right of the manor of Hapton, was called S. Anton's kage; WHITTAKER, *History of Whalley*, 4to., Blackburn, 1801, 4, c, I, p. 228.

KAGER, sometimes written Kagerer (MATHIAS), born 1566 at Munich in Bavaria, was also a painter and engraver. He studied for some time in Italy, and on his return about 1596 was appointed court painter to the elector Maximilian of Bavaria; but he soon left Munich and settled at Augsburg, where he designed many edifices, and 1623-9 reconstructed the convent-church at Zwifalten, the details of which are given in SULGER, *Annal. Zwifaltens*, p. 193, published by Stetten. Of his many paintings (often engraved), the altar-piece representing S. Andrew, in S. Martin's church at Landsbut, is considered the *chef-d'œuvre*. He was a town councillor and burgermeister of Augsburg, where he died in 1634. 5. 30. 62. 68. 69. 116.

KAHIREH (MUSR EL). The Arabic name for CAIRO, in Egypt.

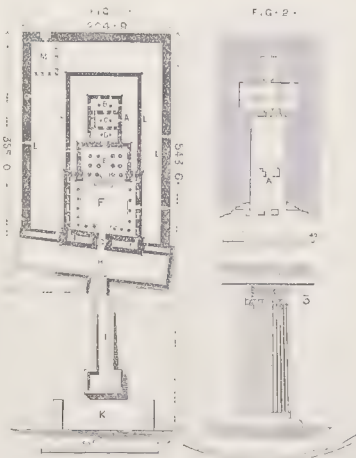
KAKAVA. The modern name of APERLÆ, in Asia Minor.

KAKORINOF (ALEXANDER) was born in Siberia. He studied at the academy of fine arts at S. Petersburg, travelled, was created 1758 a member of the academy, and 1767 was appointed court councillor and professor of architecture. Together with Major Soltikof the secretary of the academy, and M. Pin the collegiate secretary, he designed the buildings for the new academy on the right bank of the Neva, the façade of which was completed 1788 by Feltern. He became a director of the academy, but died shortly afterwards in 1771; SVININ, *Descr. des Objets—de S. Petersburg*, 4to., S. Petersburg, 1816-28. A plan and elevation are given in GRANVILLE, *Guide*, 8vo., London, 1835, ii, 138.

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KALA

KALABSHEH or **GALABSHE** (Kalapsche and Calapsche of the French), the ancient Talmis. A village situated on the left bank of the river Nile, in Nubia, and containing the ruins of the largest temple in that country. It appears to have been built in the reign of Augustus (B.C. 31 to A.D. 14), though Caligula, Trajan, and Severus (A.D. 37-211) added to it. Mandouli or Malouli is the deity to whom the inscriptions refer. The temple, fig. 1, consists of a naos A, portico E, and area F; the former being divided into three successive chambers, the adytum B, a hall C supported by two columns, and a third room D (also having two columns in GAV), opening on the portico E, which has twelve columns (three in depth and four in breadth) about 6 ft. in diameter. The area F (in which only four columns on one side are left standing) is terminated by the pyramidal towers of the propylon G, 113 ft. long, 22 ft. 3 ins. thick, and 39 ft. high to the top of existing portions, beyond which is a pavement H, and a staircase I, leading to the platform of the quay K, that sustains the bank of the river; (WALPOLE, *Memoirs*, 4to., London, 1817, p. 407, states that the



paved approach had an avenue of sphinxes, of which one remained). The temple is surrounded by two walls of circuit L, both of which are joined to the propylon. The space between them is occupied by several chambers, and at the upper extremity is a small building with columns forming the area to a chapel hewn in the rock. At the northeast corner M, is also

a small chapel which belonged to the original temple (probably of the period of Thothmes III), anterior to the buildings about it; and to the north is another enclosure of considerable extent, connected with the outer wall, and two detached doorways. The sculptures of the temple are of very inferior style: the walls have no hieroglyphics, and there are only a few symbolical figures at the gateway: the winged globe is over the portico entrance. The remains of colouring in the inner apartments were very fresh and clear in WALFOLE'S time. A good representation of the portico is given in ALLAN, *Pictorial Tour*, fol., London, 1843, p. 60.

A short distance towards the northwest are the sandstone quarries which supplied the stones required for the addition to the older building; these stones are very accurately cut and put together. In the village, among some fragments, are a Doric frieze with ox-heads in the metopes, and a cornice of Roman date.

The 'Bayt el Welles' or house of the saint, fig. 2, is a small temple excavated in the rock, and dedicated to Amunra, with Kneph and Anouke: it is of the period of Rameses II, and next to Abou Simbel is the most interesting monument in Nubia. It consists of a small inner chamber or *adytum* 6 ft. 6 ins. wide by 11 ft. 10 ins. deep; a hall 14 ft. wide by 30 ft. 10 ins. long, supported by two columns 3 ft. 3 ins. in diameter slightly fluted, with four central flat faces (some inscribed), standing on a plinth and with a square block for an abacus, fig. 3, calling to mind the Greek Doric: and an area in front of all. At the upper end of the hall are two niches, each containing three sitting figures in high relief. Casts of the sculptures on the walls of the area are placed in the British Museum. GAU, *Antiq. de Nubie*, fol., Paris, 1822, gives the large temple in pl. 17-22, and the small one in pl. 12-16. 28.

KALAH SHERGAT (also called Elassar, the *Telane* of Greek writers) is the name given to a mound of ruins situated on the right bank of the Tigris, about sixty-five miles south of Mosul in European Turkey. It seems to have been the "Calah" of Scripture and, from the last half of the fourteenth, to the middle of the twelfth, century A.C., the metropolis of the Assyrians after their emancipation from the rule of the Arab successors of the Chaldean or first Babylonian monarchy. The mound has the form of an irregular triangle measuring in circumference 4,685 yards, or double of that called Kouyunjik: it was not entirely a mass of sun-burnt bricks; but although some parts are based upon the local red and brown sandstone rocks, the central portion has been washed by the Tigris and shows the ordinary pebbly deposit of the river: it appears to be chiefly a mass of rubble and ruins, in which bricks vitrified with bitumen (some with impressions of straw), painted pottery, and fragments of sepulchral urns lay imbedded in humus, or alternated with blocks of gypsum. Over the whole of this great surface are foundations of stone buildings; but some work appears to be comparatively recent; on the north side, part of a wall consists of large stones, squared, carefully jointed "and bevelled upon the faces as in many Saracenic structures"; its top stones were cut as steps. The south-western rampart displays occasionally the remains of a wall constructed of hewn blocks of gypsum. On the side next the river are four round towers, each 4 ft. 10 ins. in diameter, built of burnt bricks 9 ins. long and wedge-shaped, with 13 and 10 in. faces to suit the plan. BONOMI, *Ninereh*, 8vo., London, 1852, p. 99. ASSYRIAN ARCHITECTURE.

KALAMA. A Roman city situated near Anouna and Bona, in Algeria, now represented by Guélma. The remains of the baths, an aqueduct, the walls of the city, catacombs, a theatre 126 ft. in diameter at the scene, with eleven rows of seats and a gallery at the back, many inscriptions, with architectural decorations, etc., are given in DELAMÈRE, *Algerie; Explor. Scientifique* (Archéologie), fol., Paris, 1844-53, pl. 171-87.

KALCANTHON (Gr. *χάλκανθον*) or Chalcanthum, shoemaker's black. A vitriolic black used by the ancients as a stain for leather, according to PLINY, *H. N.*, xxxiv, c. 32.

Under this name he probably includes green vitriol, or sulphate of the protoxide of iron, and blue vitriol, or sulphate, and hydro-trisulphate of copper, the former of which is properly copperas; PLINY, (8vo., London [Bohn], 1857, vi, 200).

KALLAESCHROS, see CALLAISCHROS.

KALLIKRATES, see CALLICRATES.

KALI SARI. A village near Borubador in Java. It contains the remains of an apparently three-storied palace, but only two in reality, which is 57 ft. 6 ins. long by 33 ft. 6 ins. wide, covered with sculpture worked very minutely and coated with chunam one-sixteenth of an inch thick. It was probably erected as a residence by one of the Hindoo rajahs, who may have built the temple situated to the north of the village of Kali Bening, and the hall of audience to the south of it. This temple is of the same general form and appearance as the chandi Sewu and the chandi Loro Jongran, at BRAMBANA, but its decoration is more delicate. In plan it is a cross with the intermediate angles projected to give space to a large central apartment entered only from the east side. The building is about 72 ft. 3 ins. square; the walls are about 35 ft. high; and the roof, which appears to have fallen in to the extent of 5 ft., about 30 ft. more: only one front is perfect. A fine coat of stucco of excellent quality covers the whole exterior surface of the temple, following the most minute and laboured strokes in the stone beneath it. The walls are surmounted by a deep projecting double cornice.

South of the village, about 150 yards from the temple, are two pair of statues facing eastwards, each about 12 ft. apart, the pedestals sunk in the ground: the height of each figure from the top of the pedestal is 5 ft. 1½ in., and the breadth at the shoulders 3 ft. 6 ins. Behind the second pair of these porters, about 30 ft. distant, is a heap of brick ruins, originally the hall of state, standing on fourteen pillars, with a verandah 12 ft. 6 ins. wide all round it, carried on twenty-two pillars. It was 47 ft. long and 28 ft. 6 ins. wide including the pillars on each side. Other ruins of brickwork may have served as out-offices; RAFFLES, *Java*, 4to., London, 1817, p. 24-9.

KALMAR or CALMAR. A seaport in Sweden, the capital of the län of the same name. The town is situated on the island Quarnholm with a suburb, on the mainland on the site of the old town burnt 1647, connected with the former by a bridge of boats. The houses are of timber, but built with great regularity since the fire of 1800. It is the see of a bishop, and the residence of a governor. The cathedral, standing in a large place, was designed by C. Horleman, cir. 1750: it is of stone and surrounded by a colonnade, and is remarkable for the loftiness of its ceiling unsupported by pillars. The other public buildings are a town-house; a gymnasium, with library of 4,000 volumes, etc.; a house of correction; and the ancient castle in the suburb, almost surrounded by the sea; one of its chambers still contains the magnificent bed of queen Margaret (she died 1396), who united the three kingdoms of Sweden, Norway, and Denmark. 14. 28. 50.

KALSA. The Hindoo term for the spire or ornamental pinnacle on a dome.

KALSOMINE. A new and inodorous sort of paint, invented by Miss Fanny Corbaux in 1840. The materials of which it is composed are at first soluble in water; a subsequent operation renders the paint insoluble by a chemical change of the properties of the material which fixes the colour durably. It is free from any offensive smell, dries in a few hours, is not acted upon injuriously by atmospheric influences, and is therefore more durable than oil paint. When finished, the work may be washed, rendering it very useful for paper-hangings, which can be thus easily cleaned: CIVIL ENGINEER, etc., *Journal*, iii, 291; from the *ATHENÆUM Journal*, 1840.

Kalsomine is described as a very fine kind of earth, burned in a peculiar manner, pure white in colour, and producing a more mellow and softer effect than whitening; DOWNING, *Country Houses*, 8vo., New York, 1850, p. 399.

KAMMIN, Cammin, and Camino. A town in the province of Pomerania, in Prussia, situated on the river Divenow. It is surrounded by walls with three gates, and has three suburbs. It was formerly the see of a bishopric, the residence being at Cöslin, but was suppressed in 1648. The cathedral, dedicated to S. John the Baptist, was erected in 1124: the elevation of the east end, with the date 1200-15, is given in KALLENBACH, *Chron. des Deutsch.*, etc., fol., Munich, 1847, pl. xx. There are also two other churches; four poorhouses; and a spacious market place. 50.

KAMPEN, CAMPEN, or COPEN (JACOB VAN), lord of Randebroek, Randebroek, Randenbroek, Rambræck, or Rambroek, was born about the end of the sixteenth century (for AMFZING, *Beschryvinge ende lof der Stad Haarlem*, 4to., Haarlem, 1628, p. 37, mentions him with praise), at Amersfoort (as stated by his friend VONDEL, *Poezy*, 4to., Francker, 1682, i, 289, in the poem called *De nachtagaal van Amisfort*, who like SCHREVELIUS, *Historie van Haarlem*, describes him as the architect to the prince of Orange; and by VAN BEMMEL, *Beschryving der Stad Amersfoort*); but at Haarlem, according to almost all other writers, who equally assume that he went to Italy to study painting, and took up architecture instead. On returning, he lived for some time at Haarlem (about 1628). He was rather an amateur in all the arts, as he seldom, if at all, took payment. He designed, and carried out in conjunction with Daniel Stalpert (COMMELIN, *Beschryvinge*, fol., Amst., 1726, i, 255, and WAGENAAR, *Amsterdam*, fol., Amst., 1760, ii, 5) the *raadhuys* or town-hall at Amsterdam, the first stone of which was laid 4 November 1648, and the edifice finished in 1655. It is described in the publication by CAMPEN, *Afbeelding van't Stadthuys*, etc., fol., Amst., 1661, which generally contains a fine portrait of this artist: there was a Latin edition, *Prospectus Curiae*, in 1664. This building was formed in 1807 into the royal palace, under Thibault and Ziesenis; a plan and elevation are given in GOETGHEBUUR, *Choix des Monumens*, fol., Ghent, 1827, pl. 59-60, with a very useful statement of the appropriation of the apartments.

Amongst Kampen's other works, which included monuments to van Galen and Tromp, and other Dutch admirals, were the hôtel of prince Mauritz of Nassau, surnamed the *Braziliaan*, which was built 1640 and destroyed by fire 1704; the house of Constantine Huygens, and that of heer van Zuilechem, on the Plein, all at the Hague; the palace at Ryswyk; and the façade of the house of the heer Huidecooper van Maarseveen on the Keizersgracht, at Amsterdam, formerly the property of the family of heer Balthazar Kooymans (given in DANCKAERTS, 1631); and several other houses, especially at Voorburg and at Lis; WEYERMAN, *Levens-beschryvingen*, 4to., Gravenhage, 1729, iii, 220. His tomb in the choir of the Great, or S. Joris (George's) church at Amersfoort has the inscription

| | |
|--------------------------------|--------------------------------|
| D'aerts Boubeer, uijt de stam, | Van Kampen rust hier onder, |
| Die't Raadhuijs t' Amsterdam | geloude heeft, t'achte wonder. |
| Jacob van Kampen | obit 13 Septemb. 1657. |

as given by the COMMISSION ROYALE D'HISTOIRE DE BRUXELLES, in the *Compte rendu des Bulletins*, 8vo., Bruxelles, 1848-49, xiv, 70; xv, 138; but 1638, 4 April 1658, and 1660, are dates generally given. QUATREMEIRE DE QUINCY, *Vies*, 8vo., Paris, 1830, ii, 199, gives a plan and elevation of the town-hall. 24. 25. 68. 101.

KAMPEN or CAMPEN (NICOLAS VAN) built 1664 the first theatre at Amsterdam, which is erroneously attributed by GOETGHEBUUR and others to the subject of the preceding article. 24. 101.

KAMPTULICON (Gr. *καμπτός*, flexible, and *ἔλακος*, material). A preparation of caoutchouc and ground cork patented before 1848 by Messrs. Gough and Boyce, and by Taylor (before 1859). This material, formed into sheets, is considered clean, warm, noiseless, dry, and very durable; qualities derived from the two substances being non-absorbent, which however render the material worse than ordinary floor-cloth in germi-

nating the seeds of dry rot in new buildings, or in damp situations, by preventing the circulation of air. Amongst the numerous buildings in which it has been laid down, the reading-room of the British Museum presents, perhaps, the largest area. It can be rolled into planks as well as sheets, and has been used for the planking of lifeboats. *BUILDER Journal*, 1865, p. 787, notices the decay of a floor covered with it.

KAMPTULITE, or elastic stone paving, an entirely different composition, prepared under a separate patent by George Walter, was laid down about 1847 in the courtyard of the Admiralty, in large blocks about 2 ins. thick; but it was removed in 1856. It was said to be composed of caoutchouc and cork or sand or sawdust, but had too much of the second ingredient to allow of the former adhering to it. It was also laid down 1847 in the courtyards of the new Houses of Parliament; for the carriage drives at Buckingham palace, and at Osborne House; and was used for the lining for a height of 6 ft. 6 ins. to the walls of the riding house at Windsor Castle, where it appears to have engendered the dry rot, and was removed.

KANARA, KANNARI, KENERY, or KENNERY, also written Caneri. A hill, in the island of Salsette in the province of Bombay in Hindostan, in which nearly a hundred caves have been excavated. It is described by FERGUSSON, *Rock-cut Temples*, fol., London, 1845, p. 34, who gives pl. 12 an external view of the great *chaitya* cave, and pl. 11 shows by a comparison of three pillars in that at Karli with as many in this example, that the latter was outside and inside merely a bad copy of the other. The plan occupies pl. 8 of the illustrative text, and the author cited considers that the centre at least of the porch must have been roofed. The nave is 74 ft. 2 ins. long by 39 ft. 10 ins. wide including the aisles, with a daghopa 49 ft. in circumference; very little woodwork remains; there is none on the daghopa, and "on the roof only the tenons and battens to which the rafters were attached; and there are no remains of a screen in the great window." The same author considers that it was executed in the ninth or tenth century, to which he assigns also an unfinished excavation figured and described by SALT, in the *Transactions* of the Literary Society of Bombay, 4to., London, 1819, i, 46. Besides these, FERGUSSON notices a *vihara* called the Durbar cave, 96 ft. 6 ins. long by 42 ft. 3 ins. wide, and scarcely 9 ft. high, with pillars like those of the Viswakarma at Ellora; the verandah has a range of eight octagonal pillars with pilasters. Below this is another cave, or rather series of cells, which gives it the appearance of being two stories in height. This is situated in a narrow glen or ravine in the hill, and is accompanied by twenty or thirty more viharas, and perhaps two *chaitya* caves; their verandahs had pillars which are much destroyed, "the material being soft laterite or breccia, little better than hard gravelly clay. The works in the ravine are supposed by FERGUSSON to belong to the fourth or fifth century; above these on the south side is another series of viharas, probably a century later. These with the great *chaitya* and the unfinished cave form a series which he considers to be one of the most modern of the Buddhist caves in India; and he is inclined to think that the greater part of them at least was executed by a colony of Buddhists, who may have taken refuge here after being expelled from the continent, and have tried to reproduce Karli in their insular retreat. A front view of the cave temple is given in ANNESLEY (Visc. Valentia), *Travels*, 4to., London, 1809, ii, 196; an account of it, in HEBER, *Narrative of a Journey*, 4to., London, 1828, ii, 190-3.

KANARAK, or KUNNARUK. An ancient maritime village situated eighteen miles north of Juggernath or Puri, in the province of Orissa in Hindostan. It contains the ruins of an ancient temple of the Sun, called by Europeans the "black pagoda", one of the most remarkable edifices in India. It is constructed of very large blocks of the light warm-coloured stone of the locality, and was erected by rajah Narsingh Deo, who finished

it in 1241. The walls are 60 ft. high and wide, and in some parts 20 ft. thick: of the *vimana* or great tower, one angle is still 140 to 150 ft. in height. The blocks of the fallen false roof of the *mantapa* or porch, about 60 ft. square, are 21 ft. long, 6 ft. by 2 or 3 ft., and were supported by wrought iron beams 21 ft. long and 8 ins. square: similar beams 12 ins. square carried the lintels of the door. Another such iron beam is found near Puri. FERGUSON, *Pictorial Illustrations*, fol., London, 1847, pl. 3, attributes its present ruined condition to the failure of the foundations placed on a marshy soil; and considers this building "as one of the very best specimens of Indian architecture as an exterior, though in Upper India there are interiors infinitely finer."

"The walls support a curiously constructed pyramidal roof, the stones of which overhang each other until they approach near enough to support iron beams laid across, on which rests an enormous mass of masonry forming the crowning ornament, giving a total height of 100 ft. from the floor. The head of the door and roof of the passage, are supported by nine iron beams laid across, nearly a foot square and from 12 to 18 ft. long, and the whole fabric is held together with iron cramps. The interior is filled with large blocks of stone that have fallen from above and crushed two iron beams 8 ins. square and 21 ft. long"; STIRLING, as quoted in HAMILTON, *East India Gazetteer*, 8vo., London, 1823.

KANDAHAR or CANDAHAR. The capital of the province of the same name in Afghanistan, and situated on the river Urghunde. Being founded in 1753 by Ahmed shah Abdalli, it is regularly built, and plentifully supplied with water by two canals over which are several bridges; from these canals lateral conduits are carried both above and below ground to almost every street. Each tribe resides in its own quarter. The houses of the Durrane chiefs are said to be large and elegant: many of the others are curious but not handsome, of brick, sometimes covered with mud. Of the many large mosques, the best is the one near the palace, in the vicinity of which is the tomb of Ahmed shah; it is not large but has a good ornamented dome, painted and gilt. There are numerous caravanserais. Four broad bazaars meet in the middle of the town, their junction being covered by a dome 135 ft. in diameter. 50. 102.

KANG. The name of the Chinese method of heating rooms by a furnace. The *ti-kang* is a furnace the flue from which runs under the floor or pavement: and the *kao-kang* is that used for heating benches and beds; the *tong-kang* is formed in the wall, and differs from the *ti-kang* only in having the flue perpendicular instead of horizontal, and being carried along the floor with openings from it, through which the heated air and smoke ascends into the upright spaces of a hollow wall: it forms a HYPOCAUST. A *tong-kang* was erected 1761 by Sir W. Chambers, to heat the orangery at Kew palace, where, in imitation of the Chinese system, he introduced heated air through a pipe or flue in contact with the heating flue. The *tong-kang* is in effect a chimney; "it is scarcely possible to improve upon these refinements of the Chinese", which are described by TOMLINSON, *Warming*, etc., 12mo., London, 1850, p. 57. An account of the *kang* is given in the PHILOSOPHICAL TRANSACTIONS, 4to., London, 1772, xli, p. 61-70, translated from the French of Gramont, with illustrations.

KANGOVAR, in Persia, see KONKOBAR.

KANGRA. The Hindoo term for a battlement.

KANKA (FRANZ MAXIMILIAN) was in practice about the middle of the eighteenth century at Prague. After having studied in Italy, he entered the service of count Czernin, for whom he built the castle at Winarz, near Prague; illustrations "of this magnificent structure" are given in LANGE, *Original Ansichten*, 4to., Darmstadt, 1837-63, ii. He also designed the family mausoleum for the count, which has been engraved by A. Neureiter; the S. Salvator church for the college of the Jesuits in the Altstadt; and the S. Catherine convent and church in the Neustadt, both at Prague; SCHALLER, *Beschrei-*

lung der Stadt, 8vo., Prague, 1796, iii, p. 541; and AUERSPERG, *Geschichte des K. Böhmischen Appellations Gerichtes*, 8vo., Prague, 1805, ii, 31. 20. 116.

KAOLIN. The Chinese name for porcelain clay, being decomposed rocks containing felspar. CLAY; GRANITE, p. 47. KARA-KALA. The modern name of ARMATRA, in Persia.

KARAMLES. The name given to a mound of ruins situated in the pashalic of Mosul in European Turkey. The place is accepted as one of the points that define the extent of NINEVEH; it is about sixteen miles south-east of KHORSABAD, and they form the two extremes of the base of a right-angled triangle which has its other limit marked by KOUYUNJIK, at twelve miles west of Karamles. The mound has hitherto been but slightly excavated, although it is nearly as large as the great mound of Kouyunjik; the discovery of the name of Sargon seems to carry its existence to the eighth century B.C. or earlier.

KARGER (. . .), a "clever architect" of Saxony, is said to have designed the Cosel palace at Dresden; MARPERGER, *Hist. und leben der Europ. baumeister*, cir. 1800, does not give the period at which he flourished. The design has also been attributed to Knoefler and dated 1762. 69. 116.

KARILEPHO or CARILEPHO (WILLIAM DE), abbot of S. Vincent (S. Carilef, in BEDFORD, *Blazon*, 8vo., London, 1858) in Normandy, and bishop of Durham 1082-96, began to rebuild the cathedral of that city "on a plan which he had brought with him from France"; SURTEES, *History of Durham*, fol., London, 1816, i, p. xix; and has therefore been usually considered to have designed it. 19.

KARLI (also written Carlei and Carli). A village in the province of Aurangabad, about half way between Poonah and Bombay, in Hindostan. About a mile from it are a number of small *vihara* caves, which are possibly as old as the early caves at Ajunta, viz. of the seventh to the tenth century. The principal *vihara* is three tiers in height (they can scarcely be called stories), consisting of plain halls with cells, but without internal colonnades, or any sanctuaries; one or two figures of Buddha do not seem to be original parts of the design. The upper tier alone possesses a verandah, the lower ones may have had that appendage destroyed by the masses of rock which have fallen from above them.

The principal object of interest is the great cave, which is the largest and finest *chaitya* in India, and fortunately also the best preserved, according to FERGUSON, *Rock-cut Temples*, fol., London, 1845, p. 27, who gives pl. 10 an external view; and pl. 11 shows by a comparison of three pillars in this example with as many in the great *chaitya* cave at Kanara, that the latter was outside and inside merely a bad copy of this great work. The author just cited states that the nave is 81 ft. 3 ins. long and 45 ft. 7 ins. wide including the aisles, with a daghopa which retains a portion of the wooden umbrella. The wooden ribs of the roof, forming stilted semicircles, rise 42 or 45 ft. from the floor, remain nearly entire, and the framed screen, like the centering of an arch, remains still in the great arch of the façade: the galleries on the screen were also made of wood. The Royal Asiatic Society *Transactions*, 4to., London, 1830, ii, 367, states that "the roof was a close resemblance to the high pointed Gothic arch. It is ribbed with teak wood, so as to fit the cove, and is attached to the stone by wooden nails or teeth. In the Ellora caves, the ribs are of stone." At some distance in advance of the arched front is placed a second screen, found only here and at Kanara, though it may perhaps have existed at the caves 9 and 10 of Ajunta. The temple, now occupied by the worshippers of Siva, was probably excavated about 163 B.C. according to FERGUSON, who, however, in the *Illustrated Handbook*, 8vo., London, 1855, p. 27, places it in the first century of the Christian era; or p. 24, in the century before or after that era, most probably the latter. A plan and section of the cave is given in that work by FERGUSON, who, in *Rock-cut Temples*, attri-

butes inaccuracy to the plan in ANNESLEY (Visc. Valentia), *Travels*, etc., 4to., London, 1809, ii, 161-5 (none in the copy at the British Museum), with a view of the interior of the cave; others in SALT, *Views in India*, lar. fol., London, 1809, pl. 14; and HEBER, *Narrative of a Journey*, 4to., London, 1828, ii, 205.

KARNAK or CARNAC, in Egypt, see THEBES.

KAROLY-FEJERVAR, in Transylvania, see CARLSBURG.

KARPUSLI, KARPUSLEE, or CARPUSLI. A village in Asia Minor, west-southwest of Arab Hissâ, containing the ruins of a Greek town, perhaps Idessa, but the Carian Orthosia according to LEAKE, *Journal*, 8vo., London, 1824, p. 234. It is described by DONALDSON, in the supp. volume to STUART and REVETT, *Antiquities*, fol., London, 1830, p. 35-6, as having an antique theatre in which "the seats are well preserved in *statu quo*, with the stairs and *diazomata* entire. The very flooring of the proscenium also remains, composed of large blocks of stone;—the scene itself, however, is ruined, as also the *parascene*, and appears not to have been very high; the construction of the whole is magnificent." There are also the remains of a street of tombs, two of which are illustrated in that volume; and two in FELLOWS, *Asia Minor*, 8vo., London, 1852, 270-3, who states that one of the "street of tombs retains its pavement of large oblong stones 8 or 9 ft. in length; the width of the way was 17 ft. formed by two stones"; there is also a *stoa* or *agora* near its top. He considers these ruins to mark the site of Alinda.

KASCHAU, KASSAW, and CASSAU, or KOSITZE (Latin *Cassovia*; Hung. *Kassa*). A city, the capital of the county of Abaujvar, in Diessets der Theiss, in Hungary, situated on the river Hernad at the confluence of the Csernel. It is the see of a bishop; and consists of the town proper intersected by the river, over which are many bridges, and of several suburbs: in proportion to its size, it is one of the best built towns in Hungary. The cathedral, dedicated to S. Elizabeth, is a Latin cross in plan, 20 klafter long by 15 wide (about 120 ft. by 90 wide) with a fine open parapet, and two towers, one only being completed and covered with copper; the other is carried up to the gable. The church was begun by Elizabeth, last wife of Charles I, 1342, and finished by Louis I (1342-48). It has the French arrangement of eastern chapels, and is supposed to have been designed cir. 1244-7, by Wilars de HONECORT of France; a plan is given in DALY, *Revue Générale*, 1856, xiv, 194; the choir is not unlike in plan to that of Notre Dame at Trêves, that is, nearly square with an apse; it has fine west and north portals; and has been described as the finest Gothic church in Hungary: the church of S. Michael, Gothic, is of small dimensions; the Jesuit church dedicated to S. Francis is Gothic, possessing two towers; and the Protestant church. The court house; the town house; the commandant's house; the bishop's palace; several good mansions of the nobility; the Ursuline convent; the gymnasium; the normal school; schools of design and music; a large and handsome infirmary; a public library of 10,000 volumes; a theatre; and several hospitals and barracks, are the other principal buildings. 26. 28. 50.

KATMANDU, KHATMANDOO, CATMANDOO, or KATHMARO. The capital of Nepal, in the north of Hindostan. It is situated on the river Bogmutti or Bhagmutty, over which are two rickety bridges guarded by two figures of winged lions. It is a large and important place, surrounded by a wall and entered by a massive gateway. The streets though narrow are broader than those of Benares, well paved, and kept very clean. The houses are well constructed, generally with singular projecting canopies and much wood carving, the open fronts are used as shops, with an upper story for the residence. The regular inhabitants are Newars, many of whom live in high and gloomy, though not inelegant mansions. The Parbatayas, by whom the town is much frequented, occupy straggling villages of earthen huts around it.

ARCH. PUB. SOC.

The most striking part of the town is the great square, containing the *darbar* or royal palace, and the Chinese pagoda. The former edifice is of vast extent, but very irregular in shape and of little architectural merit; the latter is composed entirely of wood, and has three or four roofs supported by grotesque representations of deities and other figures, and presents a confused mass of colours and gilding. There are four or five other pagodas in the square. The temple of Pusputnath, covered with lead, is considered the most sacred, with that to Buddha on the opposite side of the river, a massive pile of stone and brick about 120 ft. high, enclosed in a courtyard containing small two storied houses; and that to Sumbhoonath, considered one of the oldest in Nepaul, but about half the size of the last named, has a spire covered with copper gilt. The monument built by Bheem Singh, about 200 ft. in height, facing the parade ground, resembles a telescope fully drawn out, it has a staircase to its summit. OLIPHANT, *Journey to Katmandu*, 8vo., London, 1852, pp. 71, 153. ILLUSTRATED LONDON NEWS, 1831, xix, p. 324, gives a view of the British residency, a mixture of Gothic and Roman Doric. 50.

KATUR or CATER. An old term for a quatrefoiled panel, a band of such ornaments being described according to its length in feet, or the number of repetitions of its pattern; this will probably explain the word 'katyrcompose' in the SURTEES SOCIETY, *Priory of Finchale*, 8vo., London, 1837, cxvii. 16.

KATZKHI or CATZKHI. A town in Imeretia, remarkable for a church of the twelfth century, of which DUBOIS DE MONTFERREUX, *Voyage de Caucase*, fol., Paris, 1839, atlas, ser. ii, pl. vi, fig. 4, and *texte* iii, 161, gives a view; and ser. iii, pl. iv, fig. 12, a plan; he describes its sculptures, cornices, and ornaments of windows, as resembling in style those of Nikortsminda; that it is octagonal, surmounted by a lantern with (twelve?) windows; the eight sides occupied by semicircular chapels, and the eastern end with two additional similar apses; the front half has a narthex of nine sides which serves as a fortification; it is, indeed, sometimes called the castle of Katzkhi.

KAULMAN (JAN) was born 25 March 1764 at Dierichsweller, near Duren on the Roer. He was apprenticed to a cabinet-maker at Duren, and then went to Antwerp, where he on Sundays attended architectural classes at the academy, obtaining 1794 the great silver medal. On the reorganization 1804 of the academy by the French, he was appointed professor of architecture therein. Amongst the larger private buildings designed by him at Antwerp, are the house of madame van der Borcht in the S. Jacob's market; of M. Koelman in the Raap-street; of M. Lancker in the Plaats de Meir; and of M. Kreglinger in the great market place. He died in October 1812. 101.

KAURIE or KAWRIE PINE, see DAMMARA.

KAY (JOSEPH), born in 1775, was articled to S. P. Cockercill. In 1793 he commenced exhibiting at the Royal Academy of Arts: two large interior views of S. Margaret's church, Westminster, restored by his master, bear his name as draughtsman with the addition "Rome 1804", to which city he went in 1802, returning from his travels in 1805. In 1807 he married a daughter of W. Porden, whom he assisted in the erection of Eaton hall, Cheshire (NEALE, *Seats*, 4to., London, 1818, i). In 1808 he exhibited a "Library and picture gallery for D. W. Acraman, esq."; and 1812 "the east side of Mecklenburgh-square as now building on the estate of the Foundling hospital", to which in 1807 he had been appointed surveyor. About 1814 Kay was appointed architect to the General Post Office; and designed the post office at Edinburgh; he also made a design for a new building to be erected in S. Martin's le Grand (subsequently there was a public competition), but in consequence of a new regulation in the Board of Works, by which the government buildings in the metropolis were placed solely under the direction of the three architects attached to that office, a design by Sir R. Smirke was carried into execution in 1824. Kay keenly felt the disappointment, and from

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that time never entered into competition in designing any public works, but confined himself to private practice and the duties of his appointments. In 1823 he was appointed architect to Greenwich hospital, on the resignation of H. H. Seward. The improvements round the hospital were mostly designed and carried out by him, involving the pulling down of vast blocks of buildings, and forming new streets and lines of approach, such as Nelson-street and the new market. He was also extensively employed by the earl of Chichester, for whom he designed the chapel of S. Mary in the Castle, at Hastings; by the marquis Camden, on his estates at Camden Town, London; and by the earl of Radnor, on his property at Folkestone.

Kay took an active part in 1835 in the formation of the Institute of British Architects, of which he was one of the first vice-presidents, and a valuable testimonial was presented to him by the members. He died 7 Dec. 1847, aged 72 years, at his house No. 6 Gower-street, Bedford-square, and was buried in the vault under the chapel of the Foundling hospital, at the request of the governors of that institution. His eldest son William Porden Kay, born in 1809, was a pupil, and assisted his father for many years.

KAZAN, KASAN, or CASAN. A fortified city in East Russia, the capital of the government of the same name, and situated on the river Kazanka and its tributary the Bulah. It covers a space about six miles in circuit, and properly forms three towns, namely, the kremlin or citadel, the middle or upper town, and the lower town or rather suburbs. The citadel is still surrounded by a stone wall of great height built by the Tatars, and is flanked by fourteen towers. The upper town, in which the Russians chiefly dwell, is laid out with much regularity, and the houses are built of stone. A church dedicated to the Virgin, finished in 1737, is stated to have been designed by Jeropkin. The palladium of the place, the 'Kasanskaya Royniatser', or church of the Holy Virgin of Kazan founded 1579, has been the prototype of all other Greek churches in Russia, and contained a picture of great virtue now removed to S. Petersburg; it has another church within its walls. There are also no less than forty other churches including those belonging to the monastic establishments, one being a nunnery. The monastery of S. John the Baptist is an extensive edifice showing three steeples. Among them may be named the cathedral of Nikolskoi, of a square tower-like form, shewn in DEMIDOFF, *Excursion Pittoresque en Russie*, fol. Paris, 1848; that of the Annunciation, a Byzantine structure; and that of S. Peter and S. Paul, built of stone, and more modern than the two just named; its belfry was burnt in 1842. The *Gostinoi deor* or bazaar, and the theatre, have been rebuilt since 1842. A statue to the poet Derscharvinse was erected in 1846.

Amongst the other edifices noticed by TURNERELLI during his visit 1837-42, were the military riding school; the hospital for invalids; the principal gymnasium and its church; the university, partly saved in the fire of 1842, built of white hewn stone, the principal fronts having Corinthian columns, and containing a library and good collections; the clinicum opposite to it; the police station; the palace of the governor-general; the staff establishment; the military prison; the town hall, and the assembly rooms for nobility, both built since 1740. A large ruin at one end of the Boulac canal near the Kazanka street is sometimes called a Tatar work, but its purpose has been forgotten. The square tower of Siouyoumbecka, commonly called Sumbeka, is so called from that princess, who became regent 1546; it stands in the western portion of the Kremlin or fortress; and consists of five stories diminishing on plan, that carry a spire: the whole is about 245 ft. high, and is built of brick with excellent mortar. Close to this tower, and connected with it by a wall, is another brick building, which is apparently of the same age as the tower, square, and having on the second story a vaulted gallery; as it is divided into several chambers or halls, it is supposed to have been the

Tatar palace. But inasmuch as in 1815 more than one-half of Kazan was burnt, although the buildings destroyed were chiefly of brick with iron roofs, and the best portion again burnt in 1842, it is stated that all the older structures remain, as most of them, if attacked by the flames, were protected by their thick walls and solid construction.

The lower town, chiefly occupied by the Tatars, consists of low wooden houses, ill painted or not painted at all, in wide and clean thoroughfares. There are eight mosques, and a new one near the centre built about 1848 by a Danish architect. A Tatar mosque, a plain square windowed structure, is given in COCHRANE, *Travels in Russia*, 8vo., London, 1824, i, 106; the fortress, and the tower of Sumbeka, are shewn in TURNERELLI, *Kazan*, 8vo., London, 1851. This work, with S. S. HILL, *Travels in Siberia*, 8vo., London, 1854, gives the latest descriptions. The last named author visited near the town, on the left bank of the Volga, the monument raised about 1828 to commemorate the victory of Ivan IV over the Tatars and the capture of Kazan 2 October 1552, since which all the Christian buildings have been erected. It consists of a low truncated pyramid on a solid base of stone standing on steps, with four porticos having three doors to each; the whole is surrounded by iron railings. Behind one of the porticos is a small chapel having a sarcophagus in the centre, under which are the remains of the victors. This monument is on the road to the large monastery of Zilantoff. In the environs are also the ancient monastery of Kyzylek, and the village of Boutirka, containing the archiepiscopal palace. BOLGARY. 50.

KEAN (HENRY), see KEENE (H.).

KEANE (JOHN B.) of the office of works in Ireland, was for many years an architect of eminence in Dublin. In that city he designed 1832 the Roman Catholic church of S. Francis Xavier, executed in granite at a cost of £18,000; and 1858 that of S. Lorcán Ua Tuathail, at a cost of £10,000, which was completed after his decease by J. Bourke. He also designed 1846-50 the queen's college at Galway. His death occurred 7 October 1859.

KEARSELEY (JOHN), a physician and amateur, designed the state house at Philadelphia, which was erected 1729-34; and Christ church in the same city. DUNLAP, *Arts of Design*, 8vo., New York, 1834, ii, 411.

KEATING'S CEMENT, is now known as PARIAN CEMENT.

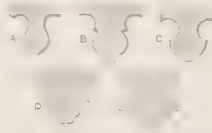
KEBLEH, see KIBLEH.

KECK (ANTHONY), born 1726, designed July 1768-11 Oct. 1772 S. Martin's church; and 1767-70 the county infirmary, both at Worcester; near thereto, a house at Beveré for Dr. Nash; and about 1788 nearly rebuilt Longworth, Herefordshire (near Mordeford), for Robert Philipps, esq., a neat brick building (NEALE, *Seats*, ser. 2, iv). He died 4 Oct. 1797, aged 70 years, and was buried in the churchyard of King's Stanley, Gloucestershire, where many gravestones of his family exist.

KEDAL. A village in the island of Java, containing the remains of a very beautiful stone temple about 35 ft. high, the sculptures of which are in the same style as those at Brambanan and Borobudur, but of greater beauty. There are no Hindoo images or traces of Hindoo mythology, other than a lion at each corner and at the steps, with some figures in relief between them; RAFFLES, *Java*, 4to., London, 1817, ii, 44.

KEEL. A modern name applied to moldings very common in the First and Second Pointed styles, which resemble the section of a boat or ship. Some are simply a bowtell finishing

with a sharp edge, as A; and a broader one, as B; others with a flat fillet, as C: some have the bowtell round on face, with two fillets like wings; others have the fillet and wings, as E; these last are supposed to represent keel and bilge boards of a boat. Diversity was thus gained without loss of mass.



KEENE, sometimes written KEAN (HENRY), designed 1775 as surveyor to the dean and chapter, the fittings of the choir of Westminster abbey, contrived for removal to make room for such other arrangements as for coronations (ACKERMANN, *History*, 4to., Lond., 1812, ii, 16). These fittings have lately been removed for others by G. G. Scott. At Oxford, he was engaged at Magdalene college for about twenty years; designed 1769 the building at the south-western corner of Balliol college; the quadrangle with the hall and chapel at Worcester college, improving upon Dr. Clarke's design; and entirely carried out the provost's lodgings: the Radcliffe infirmary, from the model of that at Gloucester: and the astronomical observatory, the first stone of which was laid 27 June 1772, but the works were suspended soon afterwards; it was to be 175 ft. in front, with a centre 88 ft. high. He subsequently made a new elevation; and the dwelling house, the two wings, and the central part were built up to the platform, before Keene's death in 1776. The upper part was altered and continued by J. Wyatt, being roofed in about 1778, but not fully completed until 1795. ACKERMANN, *Oxford Colleges*, 4to., London, 1814, p. 240, gives two views; a plan and view are given in INGRAM, *Memoirs*, 4to., Oxford, 1837, iii. SCOTS MAGAZINE, xxxiv, p. 454; DALLAWAY, *Anecdotes*, 8vo., London, 1800, p. 115-6.

KEENE (WHITSHEAD), esq., was appointed 16 Jan. 1779 surveyor of H.M. Works in the room of Thomas Worsley, esq., deceased; and was succeeded 10 Oct. 1782 by Sir W. Chambers, who became surveyor-general.

KEENE'S CEMENT. This material, invented about 1840 (after a similar production now known as Martin's cement), is "composed of GYPSUM or sulphate of lime (plaster of Paris) steeped in a solution of alum of a given strength, and then subjected to intense heat; the properties of the two compounds become so intimately mixed and exchanged, that the result is a cement unequalled in hardness and in the delicacy of its nature"; WHITE, in *SOCIETY OF ARTS Transactions*, 1842-3, liv, 163. It is then reduced to a powder and sifted. The finer sort will take a fair polish; and can be laid in patterns if desirable, as it will take any tint by a colouring matter in the process of mixing. The *Descriptive Guide* to the Museum of Practical Geology, 1859, states that if half a pound of copperas be added to the solution of alum, the paste has a fine cream colour, and the hardened mass is said to resist the action of the atmosphere.

It is a common saying with regard to the finishing coat of this plaster intended for painting, that the plasterer should work with his trowel in one hand and a paint brush in the other. It is a curious fact, that the sooner the painter follows the plasterer the more readily the paint adheres; whereas, if allowed only a few days, it takes the paint less readily and ought then properly not to be painted until quite dry. This material was formerly advertised as "to be painted upon within a few days"; of late the words run "within forty-eight hours"; but, however true this may be when the plaster is applied to old work, several days must elapse before that process can be performed when applied on *new* brickwork. It will occasionally show an efflorescence on the surface; and when laid over wood its position will in time be seen on the surface of the cement. *Stucco*, etc., by DONALDSON, in *ENCYCLOPÆDIA METROPOLITANA*, 1840.

Besides being largely used for skirtings and moldings in internal finishings, it has been employed for the floors of many public buildings, as Kirkdale gaol, Stafford lunatic asylum, the consumption hospital at Walton-on-Thames, and many others. At Greenwich hospital, all the wainscot linings in the wards were removed and this cement substituted; *BUILDER Journal*, 1858, xvi, 460. It has also been used in a portion of the interior of Dorchester house, Hyde Park; in "a not unimportant part of the decoration, in conjunction with marble", at All Saints' church, Margaret-street; in the corridors and staircases of a large range of offices in Mincing-lane, where it

was painted and polished, in imitation of coloured marbles with a very sparing admixture of white; as noticed by the manufacturers, Messrs. J. B. White and Brothers, in the same *Journal*, 1860, xviii, 315-6. This material was perhaps first used to any extent 1840-3 in the hall of commerce, Threadneedle-street. It is said to allow the use of pigments, which will not bear the admixture of lime, as in fresco painting, in which process the colours are easily mixed with it and become when dry perfectly fixed, and may be cleaned with soap and water.

KEEP, KEEP TOWER. The inner and strongest portion, or citadel, of a mediæval castle, particularly of the Norman period. It is so called in all probability from its being the residence of the lord, the word to "keep" being still used in the sense of to "dwell" in the eastern parts of England. LE-LAND, *Itinerary*, frequently uses the word when describing castles, as in vol. i, fo. 6, of Fotheringay; fo. 8, of Northampton; fo. 19, of Groby; fo. 71, of Pickering, in which case he says, "In the ynnen Court be also 4 Toures whereof the Kepe is one." CASTLE.

The Norman keep generally stood near the centre of the outworks, and on the highest part of the ground, or on an artificial mound. Those at Porchester and Richmond are exceptions. In most instances the building was square, as at the Tower of London (VETUSTA MONUMENTA) and Rochester castle: that at Windsor, however, was circular; at Carisbrook it was octagonal; and there are other exceptions, as at Conisburgh. The outworks of these castles are described in the articles BARBACAN; BASE COURT; COURT; CURTAIN; MOAT; TOWER.

The keep was the citadel or stronghold of the castle, a place to which the garrison might retire in case the outer defences were stormed; it was constructed of such strength as to bid defiance both to the battering ram and to the miner. In important places it is of large size. The White Tower of London measures 116 ft. by 96 ft., and 92 ft. in height: that at Rochester is 70 ft. square and 104 ft. high: at Newcastle the keep is 62 ft. by 54 ft., and 84 ft. high; the walls are from 13 to 15 ft. in thickness; at Colchester they are between 20 and 30 ft. thick at the level of the ground. In general they are faced with squared ashlar, and are of rubble, or more properly speaking of concrete, in the interior. At Rochester the soffits of the vaulting, which once carried the stone steps are of concrete, which having been used in a liquid state, the marks where it has gone through the joints of the cradling, or waling boards used for the purpose of construction, are as sharp and definite to the present day as when first formed.

The majority of the Norman keeps are quadrilateral, with towers at the angles finished with turrets at the top, and with flat buttresses to the sides occasionally. As an obvious method of protection, they are placed by the side of a river if possible; if not, they are generally surrounded by a moat and traversed by a drawbridge. Where this was not practicable, as at Rochester and Newcastle, the entrance is by a flight of steps leading to the first story. In the former instance, there is a break or void gap in these steps, which has evidently been spanned by a drawbridge, so contrived as to be raised and fit into a reveal, to form a strong door to the entrance, which in general is not directly into the main quadrilateral building, but into a projecting building by the side, forming a sort of large porch, in which or over which is frequently a chapel. This entrance has not only the protection of the raised drawbridge, but behind it there is frequently a portcullis, intended as a defence in case the drawbridge should be battered down or burnt. The object of the keep was to oppose a stubborn obstacle to any sudden outbreak on the part of the Saxon people, who largely outnumbered their invaders; a place so strong as to hold out till assistance might arrive from other barons, and which nothing could reduce but the absolute starvation of the garrison. This was the case at Rochester castle when besieged by king John.

It may be convenient to describe these buildings story by story. The floor, level with the ground, is generally groined, having slit openings of the fewest possible number and of the narrowest dimensions, enough only to afford ventilation; some have been lighted only by lamps, and have no apertures. None have entrance doors from without. The general opinion is, that this floor was used only to hold provisions and other stores. In the larger keeps, the plan is divided across by walls or columns. Beneath this, and below the level of the ground, most dismal holes are found, which were the dungeons. Most of these have no openings for light, and the only available air must have made its way through chance crevices. COLINGWOOD BRUCE has considered, from several circumstances, that they are of subsequent formation. Above the ground story seems to have been the soldiers' guard chamber. The entrance to this, through the attached building by an outer door and portcullis, has already been described. Turning short at right angles is another door, by the sides of which recesses are formed where soldiers could stand sheltered from missiles, and could use the battle-axe with fatal effect; these are popularly called "murdering holes". Narrow passages pass through the thickness of the walls. When the area of each story was divided by ranges of columns, they supported a floor, and the holes for the joists shew them to have been of timber. In one angle of the building is generally a wide staircase winding round a newel; and there were occasionally other smaller private staircases.

The story over this last, or the second floor, seems from its superior finish and decoration to have been the principal apartment of the baron: the story over this last, the bedrooms and apartments for ladies, is generally subdivided. At Guildford and several other places there are chambers in the thickness of the walls. On the top of the walls there is generally a parapet with a walk round, and at the angles, a staircase, a turret, or a watch tower. The roofs seem to have been in two or more spans, and of timber. A number of holes are found in parts of the walls, which are supposed to have been for pigeons, that the besieged may not have been wholly without fresh provisions while surrounded by hostile troops. Water was obtained by a well; that at Carisbrook castle is 145 ft. in depth, though it is popularly stated to be 300 and 600 ft.; in general, it is ingeniously concealed either in the thickness of the wall or interior of a column, so that in case the besiegers got possession of the lower stories, the garrison might still be able to draw water to the upper ones. Many keeps are entirely without fire-places: a particular instance is the White Tower of London. At Rochester are some handsome arched openings; but there are no flues, the smoke escaping outwards through a hole in the wall. It is probable that in such cases the cooking was done by charcoal; and if the weather was very cold, brasiers may have been introduced into the best chambers. In some late instances the flues rise to the uppermost floors. GARDEROBES or *labrinæ* are often found in the thickness of the wall, or project.

The lower windows are mere arrow-slits; those above increase in size and width when they are so high, that an arrow entering could only strike the soffit. The uppermost range occasionally are decorated with shafts and pillars, and have two openings or lights. There is mostly a room devoted to the purposes of worship; in general this is a regular chapel; at Dover there are two, one over the other; the lower for the garrison, the upper for the castellan. These double chapels seem to have been constructed chiefly in royal or government edifices, as at Westminster, the Sainte Chapelle at Paris, at Bruges, etc.

The Norman keep exhibits a very striking adaptation of architecture to the exigencies of the times. The invaders were few in number, but well armed and provided. Their great desire was to possess an impregnable retreat in case they were outnumbered. The outworks have been so altered that it is

difficult to describe their state; it is supposed they were of less importance than in later times. The siege, however, of the keep itself must have been a most serious undertaking. When the outworks were stormed, the besiegers could only approach the keep through a shower of missiles, descending with double force like a "plunging fire". As they attempted to scale the steps or break down the drawbridge, the danger must have increased, as large stones could be hurled on their heads. If the raised drawbridge was broken or burnt, the portcullis was still before them. If this was destroyed, no easy task, the besiegers were in a small space, where darts and lances might be thrown down from above, and another gate still to be burst through. Then came the dangers of the winding staircases and the "murdering holes"; and all this was to be repeated again and again at every story. It is said that Gundulph, bishop of Rochester, was the inventor of this system of fortification; but this has been much doubted. GUNDULPH.

In later times the keep seems to have possessed much the same arrangements as in the earlier ones; but the angle towers became circular and much larger, and about the Early English period were protected by MACHICOLATIONS. Castles then became stronger in the outworks; the main defence being a sort of enlarged keep having ranges of apartments round a court, with large circular flanking towers, as at Conway. *ARCHÆOLOGICAL ASSOCIATION Journal*, ix, 346. A. A.

"Braymounds" is a term used by old authors for double keeps, as at Lewes castle in Sussex.

KEEP. A stop to a door. It is also the name applied to a shutter fastening, which has been in great measure superseded by the spring catch; it will often be found described in old specifications by the name of 'catches' (as A) and 'keeps' (as B). The keep is hung on a pin or screw, and falls on the shutter bar (C) so as to prevent it being lifted from the outside. It is also the name of a sort of square staple keeping the bar of an ordinary THUMB LATCH in its place. A. A.

KEEPER. A term very commonly used in the Records for an officer appointed to take care of certain works, of a building, or of a portion of a building. He may not, necessarily, have been a designer. The following are among many of the instances of its use. Several others of interest will be found in *SURTEES SOCIETY, York Fabric Rolls*, 8vo., Durham, 1859.

- 1223. "Custodes operationum" at Windsor, translated "general superintendents of the works", by E. SMIRKE, in *ARCHÆOLOGICAL ASSOCIATION Journal*, Winchester volume, 1, 3-46.
- 1237. Odo the goldsmith "custodi operationis" at Westminster.
- 1246. Succeeded by Edward Fitz Odo.
- 1252. "Custodi librorum regis" who were to supply colours for painting.
- 1257. Keeper of the fabric of the church at Westminster.
Keeper of the old fabric of S. Paul's cathedral.
- 1260. Keeper of the Great Seal.
- 1273. Keeper of the works at the Tower, £20 to provide necessaries for the same "by view of A. le Hurer, and Master Thomas of S. Sepulchre, overseer of the works aforesaid."
- 1278. Keeper of the Tower of London; kept the account of works done there, at the Mews, and at Westminster.
- 1325. John de Ditton, clerk and keeper of the works in the palace at Westminster, and at the Tower of London.
- 1327. The 'custos' was then the 'controller' also.
- 1328. "Keeper of our works" at Westminster and at the Tower.
- 1330-38. Walter de Weston, "Clic. Opac. Dni. Reg. Palac. Westm. et Turr. London."
- 1331. Also called "custos operacionum."
- 1370. The keeper of the king's private palace at Westminster was paid 6d. per day.
- 1484. "Yeoman of the corone" made keeper of "the toure nigh unto th' Exchequer."
- 1484. Keeper of the park of Wilgolet in Essex.
- 1530. Keeper of the old palace at Westminster.
- 1576. Keeper and overseer of the buildings and tender of the stock in Dublin castle.

DEVON, *Issues*, etc., 4to., London, 1837; and *Brantingham*

Rolls, 4to., London, 1835; BRAYLEY and BRITTON, *Palace*, etc., 8vo., London, 1836.

KEEPER'S HOUSE. The residence for a keeper where the game is preserved. It differs little from the ordinary agricultural cottage, except that perhaps it may be on a somewhat larger scale for a head keeper. Where there are many dogs kept, a regular KENNEL ought to be built contiguous to the residence.

A. A.

Sometimes it possesses a turret as a watch-tower in which an alarm-bell to summon the under-keepers may be hung. A LODGE at the entrance to a royal or public park or garden is usually called a keeper's lodge, because occupied by a park-keeper, who is generally a constable.

KEEVEY WORK. A large vessel made of red deal boards and hooped both with iron or strong oak hoops is called a keeve or kieve. Country masons employ such in building a rough stone bridge; they are sunk in rows with the weight of stones thrown into them, the workman filling the vacancies between the circles and banking them round with rude stones, etc.; SEMPLE, *Building in Water*, 8vo., Dublin, 1776, p. 60. 'Chest work', and 'case work' or CAISSONS, are other and better methods. KESH WORK is the roughest mode.

KEKEYA, an architect who had constructed the castle of Bhutnair, suggested to Deoraj prince of Jessulmer (born A.D. 836) to obtain in the depth of the desert, from the Boota chief, such a quantity of land as could be encompassed by thongs cut from a single buffalo's hide. The prince immediately commenced erecting a place of strength, which he called after himself Deogurh or (on the maps) Deorawul, on Monday, 5th of the month Máh (Soodi), the Pook'h Nikhitra, S. 909, i. e. A.D. 853; TOB, *Annals of Rajast'han*, 4to., Lond., 1829, ii, 235-6.

KELDERMAN or **KELDERMANS.** The usual name of several artists, whose family name seems to have been MANSDAELE or MANSDALE according to SCHAYES, as hereafter cited, but is GANSDAELE in other works.

KELDERMANS (JAN), "meester werelman van der metselreyn van der Stat," was employed to complete the old hôtel de ville, now the council chamber, offices, etc., at Louvain, after the death of S. van Vorst in 1439. The works were completed in August 1442. The present hôtel de ville was commenced by De Layens, who succeeded Keldermans 21 May 1445; COMMISSION ROY. D'HIST. DE BRUXELLES, *Bulletin*, 8vo., Brux., 1848, p. 588.

KELDERMANS (.....) designed the tower of the münster at Zierikzee, commenced 1451, but which was stopped when it had reached 175 ft. in height, and has not since been continued. A description of the tower mentions the intended height to have been 680 ft.

24.

KELDERMANS (ANDREAS), "maître des travaux de la ville de Malines," was consulted by De Layens in 1481 on the state of the tower of S. Pierre at Louvain; COM. ROY. D'HIST. DE BRUXELLES, *Bulletin*, 8vo., Bruxelles, 1848, p. 590.

KELDERMANS (ANTONIJ) of Malines, was "maître ouvrier des maçonneries de Monseigneur le Roi" (afterwards the emperor Charles V, 1519-58). He designed 1509 (finished 1521) with his son ANTONIJ, for the emperor Maximilian and Margaret of Austria, the *cours des Bailles*, in front of the palace of the dukes of Brabant at Bruxelles, consisting of an open worked stone balustrade, with pedestals and columns for statues, etc., (described by SCHAYES, *Pointed Style*, in *WEALE'S Quarterly Papers*, 4to., London, 1843-44, p. 41). One of these artists (it is not clear which) is stated to have died 1516. To one of them is attributed the design, in a mixed Gothic and Renaissance style, of the *maison au pain* (broodhuis) or *maison du roi*, opposite the hôtel de ville at Bruxelles, executed (1514-23, and completed as to the exterior 1531 according to SCHAYES, *Hist.*, 8vo., Bruxelles, 1850, iv, 64, by "Antoine, Dominique et Rombaut Kelderman (toute une famille d'architectes), Dominique de Wagemaker, Louis van Beughem ou Bodeghem, et Henri van Pede"; but in the *Quarterly Papers*,

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p. 44, he commences that list (apparently more accurately) with Antoine, Rombaut, and Mathieu Kelderman; *MESSAGER*, etc., 1842, p. 10. It was restored 1841, and is now used as the *cercle artistique et littéraire*.

101.

KELDERMANS (ROMBAUT or RAMBAUT), born at Malines, became "maître-général des œuvres" to Charles V, in which office he had a salary of 60 livres, the daily wages of the masons being 3, 4, and 5 sols. He was invited 1528 to Oude-naarden to design a staircase more handsome than that executed 1527-9 by H. van Pè, Pede, or Preede, for his hôtel de ville (*MESSAGER DES SCIENCES*, 8vo., Gand, 1829, p. 86; *REVUE DE BRUXELLES*, 8vo., Brux., Oct. 1837, iv, p. 8). Together with D. de Wagemakere (of Antwerp), he was employed to advise E. Pollejt, who pulled down most of the work executed 1516-27 by T. Stassins or Tassins to the façade of the hôtel de ville at Gand, but only rebuilt the lower portion in the rue Haute Porte (*Illustrations*, 1854-5, s.v. Balcony; and 1859, s.v. Gable), the works being discontinued in 1560. He also designed the house for the *grand conseil* (*nieuwe paleis voor den grooten Raad*) at Malines, commenced 1530 but not finished (the plans are preserved among the town records); and designed 1525-53 the chapel of the palace of the dukes of Brabant at Bruxelles, which passed for one of the best edifices of the Late Gothic style of architecture in Europe; it was of great extent and considerable elevation (SCHAYES, in *Quart. Papers*, p. 42, further describes it). The whole was pulled down in 1774.

101.

KELDERMANS (MATTHEUS), "maître ouvrier" of the city of Louvain, 25 May 1517, was brother to Rombaut, and worked with H. von Pede at the *broodhuis*: *MESSAGER*, etc., 1842, p. 10.

101.

KELDERMANS (LAURENT), nephew of Rombaut, received on or about 21 June 1519, 38 livres, 7 sous, 6 deniers, being at the rate of 25 sous per day's work, for making the model in wood of the vaulting of the *broodhuis*; *MESSAGER DES SCIENCES HISTORIQUES*, 8vo., Gand, 1842, p. 10.

KELLESEYE (WILLIAM DE) was appointed 3 January 1328-9 (2 Edw. III) clerk of the works at the palace of Westminster and the Tower of London, receiving the same wages (1s. per day) and fees as W. de Chaillou, his predecessor; he was invested with office three days afterwards by the controller (Rot. Orig. Abbrev., ii, 5 and 24, Rot. 8 and 21, in BRAYLEY and BRITTON, *Palace*, etc., 8vo., London, 1836, pp. 125, 198, 244); and was succeeded by W. de Weston in 1331. On 28 July and 1 Nov. 1337 (11 Edw. III) he was constituted controller of the payments of the chamber at Berwick; and in 1347, supervisor of the munitions, men, and victuals on the Scottish border: ROTULI SCOTIE, fol., London, 1814, *sub Index*, for numerous references, the last being dated 24 Edw. III, Westm., 1 July 1350, p. 735, at which time it would seem he had been superseded.

KELLS (anciently Kenlis). A market town near the river Blackwater, in the barony of Kells, in the county of Meath, and province of Leinster, in Ireland. United with Meath it forms the see of a bishop. A monastery of Canons Regular was founded by S. Columb in A.D. 550; also a priory for Crouched Friars by Walter de Lacie, lord of Meath in the reign of Richard I. (1189-99). No remains of these buildings exist with the exception of a stone roofed oratory called S. Columb's house, the remains probably of one of the original buildings. It measures 19 ft. in length and 15 ft. 5 ins. in breadth clear of the walls, which are 3 ft. thick. It has a semi-circular vault of rubble work, over which is a high-pitched roof of dressed stone, in courses overlapping each other; a small semicircular-headed east window; an angular-headed one in the south wall; and a modern opening roughly broken through the south wall: the original doorway was at the west end. The church, an erection of the latter end of the sixteenth century, is not worth notice. A mediæval square tower, probably belonging to a more ancient edifice, stands detached.

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The round tower, situated on the verge of the churchyard, has been stated by GROSS to be 99 ft. in height. It is built of spawled rubble masonry of excellent character, but it has lost its conical roof covering; the unusual number of five window openings are found in the top story; they are all angular-headed. Four other openings at various heights are all quadrangular. The door faces the north, and is semicircular-headed, with a raised flat band or architrave 8 ins. wide; the sill is 12 ft. above the ground at the road side, and 6 ft. above the graveyard. The thickness of the wall at the door sill is 3 ft. 4 ins.

In the main street there is a stone cross richly sculptured, (O'NEILL, *Ancient Crosses of Ireland*, fol., Lond., 1853-7). In the churchyard is another rich one, 12 ft. in height; while fragments of two others of much greater dimensions lie on the ground; one of these if erected would stand 26 ft. in height: a great number of mutilated sculptured gravestones lie about them. WILKINSON, *Geology and Architecture of Ireland*, 8vo., London, 1845, p. 73 and 252, describes the round tower, and notices the circular castle (FORTIFICATION) as built with the local rock (of a slaty texture), which is extremely durable, but does not admit of being worked. The modern buildings of the town have no architectural importance. R. R. B.

KEMMETER (. . .) designed the new church in the *Gen's d'armes platz* at Berlin, with a tower similar to that of the French church; and the stables of the schloss at Rheinsberg, superintended by C. F. Feldman. H. G. W. Knobelsdorf was a pupil.

KEMP THORNE (SAMPSON) of Gloucester, exhibited a design at the Royal Academy of Arts in 1833, and was at Rome in December of that year. With S. S. Teulon, he exhibited 1835 a design for a town hall and market place at Penzance, Cornwall; in 1836 a "new church for native converts at Waimate, New Zealand, about to be erected for the Church Missionary Society"; 1837 a lodge at Hadzor, Worcester, for J. H. Garton, esq.; 1838 alterations and enlargement of Messrs. Barnett, Hoare, and Co.'s banking house, Lombard-street; and 1840 a new chapel at Guilsborough, Northamptonshire. In 1836 he built the workhouse at Abingdon, Berkshire, the first completed under the provisions of the Poor-law Amendment act; it cost £8,500 (a view is given in COMPANION TO THE ALMANAC); designed a workhouse for the guardians of Witney union (*BUILDER Journal*, xiii, 489), but it was not executed; 1837 built the church of Barton or S. James at Gloucester; Oct. 1837-8 Holy Trinity church, Lower Rotherhithe, for 1,000 persons, costing £5,770 with endowment; and July 1839 All Saints church, Rotherhithe, for 1,000 persons, costing £3,400; these three buildings are noticed in the *BRITISH CRITIC*, etc., 8vo., London, 1840, ii, 496-7. The *First Report* of the Poor-Law Commissioners, fol., London, 1835, contains ten plans and elevations of workhouses prepared by him; in the *Second Report*, 8vo., London, 1836, p. 636, there is another design; and the *Minutes*, etc., of the Committee of Council on Education, fol., London, 1839-40, contains twenty-three sheets of schoolhouses drawn from his designs. Kempthorne was one of the first associates at the formation of the Institute of British Architects in 1836; he left England for New Zealand about the end of 1841, and is supposed to have died soon afterwards.

KENDALE (JOHN), in March 1461, had a grant for life of the office of supervisor of the king's works throughout the realm (Rot. Pat. 1 Edw. IV, p. 3, m. 16). He was cofferer to the king's household (Rot. Pat. 8 Edw. IV, p. 1, m. 12); and in 1480 he was one of the persons whom Edward IV assigned to attend upon his sister the duchess of Burgundy during her visit to England, when he had a livery of a jacket of murrey and blue cloth (Wardrobe account Edw. IV, p. 161). In the following year the king appointed him one of the comptrollers of the public works for life (Rot. Pat. 21 Edw. IV, p. 2, m. 13), for which office he was paid £18:5:0 per

ann. and £9:2:6 for his clerk (Harl. MS. 433, fol. 311). In the reign of Edward V, Kendale was chief clerk of the king's bench; and Richard III, immediately on his accession (23 June 1483) appointed him his secretary, with a livery of six yards of scarlet (*ANTIQ. REPERTORY*, i, 28). He was also reappointed chief clerk and keeper of the rolls of the king's bench; and obtained among others, the offices of comptroller of the exchange and assayer of the mint (Privy Council Proc., vi, xcii); keeper of the palace and park at Havering atte Bower, with *iii*d. and 26s. 8d. per day; and one of the rangers of the forest of Dean, at *vid.* per day; with the keepership of the place called the prince's wardrobe during the king's pleasure, with twopence by the day of the receiver of the Duchy of Cornwall (Harl. MS. No. 433, fo. 63 b, 90 b, 98 b). He fell in the king's cause at the battle of Redmire or Bosworth Field, 22 August 1485; and his name was included in the act of attainder passed in the first parliament of Henry VII. DAVIES, *Extracts from the Records of York*, 8vo., London, 1843, p. 165; WALPOLE, *Anecdotes*, edit. 1864, i, 124.

KENDALL (JOHN) "the cathedral mason and architect", undertook the new works at Exeter cathedral from about 1805 to 1830; including the restoration 1813 of the upper window of the west front; 1814 new fronting the chapter house and chapel of the Holy Ghost, except the entrance door to the former; 1814-17 the south clearstory windows and buttresses in the cloisters; 1818 a new reredos; 1817-19 the restoration of the basement and upper part of the west front; 1819 additions to the organ screen; 1821 the new gallery screen at the west end of the chapter house, and the chimney-piece; 1822 the Lady chapel refitted and sculpture restored; and 1821-7 various external reparations. He published *An Elucidation of the Principles of English Architecture, usually denominated Gothic*; 23 plates of examples taken from Exeter cathedral, 4to., London, 1818 (reissued in 1842); this work has become scarce; and a folio print of the "Elevation of the east end, showing the window, and the new altar piece, stalls, etc." He died at Exeter Oct. 1829, aged 63, and is therefore probably the same person who 1781-84, while yet in the office of J. Paine, exhibited "designs" at the Royal Academy of Arts.

KENERY and KENNERY, in Hindostan, see KANARA.

KENGAVAR, Kengaver, and Kengover, in Persia, see * KONG HAR.

KENLA (LAMBERTUS DE) was 1253-58 twelfth Cistercian abbot of Nôtre Dame des Dunes, near Bruges, and built the refectory, "ac cæteras domos necessarias"; SANDERUS, *Flandria Illustrata*, fol., Cologne, 1641, i, 250.

KENMARE. The celebrated early native work, the Staigue fort, at this town, is described under IRISH ARCHITECTURE.

KENMUIR STONE. The quarries situated near Bishopbriggs in Lanarkshire, about three miles south of Glasgow, furnish a fine white freestone, which is generally wrought or "polished". It is of the old red sandstone formation; the price at the quarry is 1s. per foot cube, which weighs nearly 144 lbs.

KENN. In the accounts for building the steeple of Louth church, Lincolnshire, is a memorandum that the abbot of Revesby had lent 15 kenns of stone containing 15 yards; *ARCHÆOLOGIA*, 4to., 1792, x, 77. *Kental* (Fr. quintal) signified a hundred weight; NARE, *Glossary*. 19.

KENNEL. The habitation of one dog or more; greyhounds are said to thrive best when kept four in a compartment; a four day's pack of foxhounds comprises two packs, each of twenty-five couples, one resting while the other is working, and each pack of fifty may be lodged together.

A common gabled wooden kennel of sufficient size (a point sometimes overlooked), for one dog, should have the back legs 1½ or 2 ins. shorter than the front ones, the floor pierced with inch holes, a hole 3 ins. in diameter with swinging battledoor shutter in each gable, a door hung to shut itself on the front, and at least one half of the roof hung to open, but with a water-tight joint; the front itself ought to open for the convenience of

washing and brushing, but this is rarely the case. There should be no ledge under the jaw, when the dog lies with his muzzle in the doorway; and the floor may be from 4 to 6 ins. above the ground, according to the size of the animal, at the door which he soon learns to open for himself if it be not fastened. Warmth, regulated ventilation, cleanliness, and dryness may thus be provided for a favourite; but many a dog, apparently in equal or better health, though not perhaps in so good condition, may be seen under a few loose boards or in an old barrel (unsheltered even by an open shed) at cottages and small farms.

Where several dogs of one kind are kept together, their peculiarities require attention; for example, while foxhounds curl, greyhounds couch, to sleep; further, greyhounds require a temperature between 60 and 64 degrees in winter, and as low as possible in summer. Each yard to the sleeping compartments need accommodate not more than four dogs, two only being fed at a time. Proper ventilation and some means of warming the kennel must, therefore, be provided; the roof should be packed with reeds or other material within deep rafters, between the slating and the plastering of the ceiling. Four dogs may sleep on a bench for filth to drop through in a compartment 7 ft. by 5 ft.; the paved yard need not be more than double that size; six or eight puppies may be kept together. A south aspect is recommended for the houses of brood bitches and of dogs not in running order. In other respects an establishment for greyhounds will not much differ from one for staghounds, foxhounds, harriers, or beagles. The nature and number of the animals must decide the adoption of any of the following requirements, which, taken all together, might form a model kennel for a hundred staghounds or foxhounds.

These requirements will form three groups for combination in one or more buildings—1. A lodge and its yard for fifty dogs (if the principle of smaller rooms be not preferred); an attendant's room opening to each lodge; a feeding room with hatched doors leading to two yards to each lodge (but one room with its central troughs may serve both or all of the lodges if each has a separate yard to the feeding room); a boiling room 30 ft. in height (to ventilator) fitted with a straining board, chopping box, flesh copper, and pudding copper; this room usually contains the pudding trough or cooler, which, to avoid fermentation, had better be placed in the feeding room; and the boiling room situated with the following group, where that exists at a distance. A third lodge, sometimes divided, for washing and drying, with or without a yard. It has been found advisable to sink the fire-places of the coppers about 18 ins. below the level of the floor, so that the attendant may work the coppers at 3 ft. from the floor; hoods over them into flues are necessary. The cooler 3 ft. wide by 10 or 12 ins. deep, will be long enough to receive the whole contents of a copper, it is fixed about 2 ft. 6 ins. from the floor. 2. A straw room; a coal shed and wood shed; a well luffer-boarded flesh room; a meal store fitted with galvanized iron bins; a place for manure; and another for ashes, bones, etc. 3. Lodges for lame hounds, sick hounds, sick puppies, bitches on heat, bitches with pups, and young hounds; each having a separate yard; a grass yard for puppies is essential; ranges of small rooms are useful, whether assigned to single dogs, or to bitches who should be kept as far as possible away from the dogs, and when taken to be fed should not cross the yards of the dogs. The establishment may be considered to be completed by the addition of a yard to be used as a drafting court on the west of the lodge yards; and there should be a small meadow appurtenant. The huntsman's house is not necessarily a part of so large an establishment; in smaller ones, three rooms, with a pantry, etc., will probably be sufficient for him living alone; and the same allowance may be made for the whipper-in. Most of these details, in various combinations, will be found in TATTERSALL, *Sporting Architecture*, 4to, London, 1841; who gives two model designs; and plans of the kennels at Kington,

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co. Warwick; Billesdon, co. Leicester; Tedworth, co. Hants (with circular lodges in the yards, once said to be as complete as human ingenuity and experience could make it); Goodwood, co. Surrey, for two full packs, it cost £10,000; Cobham, co. Surrey; Petworth, co. Sussex, with central beds in the lodges; and Kingston, co. Oxford. The Atherstone kennel at Witherley, co. Leicester, has been highly praised; the convenient kennel of the Hampshire hunt, and also that at Puckeridge each cost only a few hundred pounds.

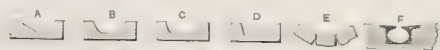
The kennel at Woburn Abbey, about 400 ft. long, said to have cost £10,000, for sixty or seventy couples, was long considered to be the most complete in the kingdom. The centre comprised the boiling house with adjoining feeding houses, and a meal store behind; one wing containing apartments for two kennel-keepers, two long lodging rooms for the working hounds, and seven kennels for sick hounds; the other wing holding litter and straw sheds, eleven kennels for bitches in pup, and a lodge for bitches at heat. The Quorndon kennel for a hundred couple furnishes an example of lodges circular in plan with round central benches; this was intended to avoid any damp from the walls. The Quorndon and the Badminton kennels have been criticised as having lodges so large as to be cold and comfortless to the extent of causing the hounds to shiver in them.

In the work above cited, a clay soil is recommended by some authorities as preferable to sand or friable sandstone on account of its freedom from evaporation; and the royal kennel at Ascot is cited as an instance where the evaporation from such a soil produced the disease called kennel lameness or rheumatism. Other causes, inclusive of laying on cold ground after work, have been assigned for this plague, but none, although suggesting an inflammatory condition from high feeding, have added susceptibility to constant draughts. It has been asserted that little or no amendment was produced at Ascot by raising the floor on arches; and this might be expected if the real cause was not evaporation from the floor, but the natural dampness of a site under a hill. The empirical preference given by masters of hounds to a clay stratum for the kennel may receive the professional explanation, that the evaporation which is to be dreaded is not due to the other strata themselves, but is the return of urinated moisture that has sunk through the flooring; hence a covering of puddled clay, formed to the falls, forms a pond for that moisture, and leads it at once away in the channels formed for the drains. If this be correct, no arches backed with rubbish, no concrete, chalk, large stones, or cinders, will efficiently replace the puddled clay; and on this point the backing, over the tanks under the brick floors, at Goodwood should be examined, as it ought to be decisive. It may be suggested that too much care in the matter of warm lodging is given to hounds; that the stoves, flues and hot water tubes had better be confined to one lodge, not for washing but for rubbing or brushing and drying, and that a room open to the underside of a tiled roof, neither mossed nor pointed, might be found more healthy than one with a plastered ceiling having any of the usual ventilators, which allow of a draught downwards. It should be noticed that such authorities as Mr. Beckford and Colonel Cook doubted the utility of warmth applied to the lodges. Warmth is undoubtedly necessary to hounds after work, but the period for which that warmth should be supplied has not been defined. If the theory which thus attributes kennel lameness to draughts be correct, the hounds should have a drying room free from draughts, and after a fair period (say two or three hours) be turned into their own lodge to be set for the night; and further, if that lodge should have partial draughts, even so slight as not to move a tape suspended, the experiment of putting round the lodge a gallery, whose floor should be the roof of a series of separated beds, might render a large lodge as healthy as the merest barns or outhouses, in which many a convenient kennel has been formed in a home-stead. A close front to the gallery would make its handrail about

8 ft. from the ground or bench; and fresh air might be admitted at the level of its floor to be thrown upwards by that front. The usual admittance of external air at the top of the walls must now be recognised as an error: with the exception of that point, reference should be made to the advocacy of small lodges with compartments of benches in TATTERSALL, p. 74. If the windows were for the purpose of ventilation, they should have hit-or-miss shutters; or perhaps external shutters would be preferable, especially if there be no gallery for inspection; in every case, to keep out insects, etc., the window should have an inside guard of wire gauze or lattice, which seems to be preferable, as far as light is concerned, to perforated zinc work. The doors, 4 ft. 6 ins. wide, are supposed to be best placed at the corners of all the rooms; and, like the doorways, should have no arisès where a hound can touch. It is possible that the introduction of asphalte as the floor itself would be found to be more conducive to health than as a bed for either cemented brick or stone pavement with channels to prevent the urine from spreading. A fall of half an inch to a foot, from back to front, is allowable; and a small cesspool under each grating prevents a stoppage in the main drains, which should be kept as central as possible, and have an inch fall to a foot if so much can be obtained. A skirting of asphalte would dispense with the wooden dado 3 ft. high that has been recommended in lieu of plastering to the walls, which will average from 10 to 12 ft. in height; but it might be worth while to build as a lining 3 ins. from the wall a half brick wall in cement, 4 or 5 ft. high, carrying a wooden curb, to which would hang lids of plate iron opening against the wall; thus ventilation might be managed, and the fresh air be thrown upwards, whether the air be taken from air bricks in the wall or supplied by pipes. The benches made of iron-bound wood must be warmer than those made of cast-iron; they are sometimes arranged so as to turn back to the wall when the floor is being washed, after the benches themselves have been cleansed. The fences or partitions to the yards should be solid to a height of 4 ft. to prevent the hounds in one yard from seeing into the next, but may be finished with open work such as railings to 8 ft. in height; if the fences are of wood they should have a flagged walk along them to prevent the hounds from scratching out. The separation, from the main building, of the kennel for young hounds has been advocated; and also that of the infirmary for hounds that are distempered, mangy, bitten by suspected dogs, or peculiar in their own manner. It may be affirmed that no plan for a kennel should be said to be thoroughly considered until its designer has compared it with the establishment at Luton Park.

HUNT, *Tudor Architecture*, 4to., London, 1836, p. 32-42, and 192, contains a plan with appropriate observations. Two pages of illustrations of the *Economy of the Kennel* are given in ILLUSTRATED LONDON NEWS, 1849, xv, 348-9. HAMILTON, *Reminiscences*, 8vo., London, 1860, ii, 114-8, details the requirements of a kennel. The notion of a *chenil* on a large scale in France included "plusieurs cours, salles et chambres, — à loger les officiers de la vénerie, les valets, et les meutes de chiens de chasse."

KENNEL (It. *gronda*; Sp. *arbellon*; Fr. *chénau*; *culière* is a stone with a *goulette* which takes the water from the down pipe into the kennel; Ger. *abzugs-kanal*). The open channel or drain for the collection and carrying away of the water in a thoroughfare or yard. The following figures show the usual forms of kennels or channels made with stones and



bricks. c is the old section for cowhouses; d, the one now usually employed; e is that for a street; and f, that for a stable or across a paved footway.

KENT (WILLIAM) son of Richard, was baptized 27 March 1684 at Rotherham in Yorkshire (HUNTER, *South Yorkshire*,

fol., London, 1828-31, ii, 13); WALPOLE, *Anecdotes*, had long stated that Kent was a native of that county, and that he was placed apprentice to a coach painter, whom he left and repaired to London, where he studied drawing. By the assistance of some county gentlemen, he accompanied W. Talman 1710 to Rome, where he studied painting under the cavalier Luti, and gained the second prize of the second class in the academy. The BRITISH MERCURY, 5 Aug. 1713 records that "Mr. W. Kent, born at Bridlington in Yorkshire, is said this year to have gain'd the annual prize given by the pope in the capitol, for painting." Sir W. Wentworth allowed him £40 per annum for seven years. He returned 1719 to England with lord Burlington, who provided Kent with an apartment in his house, he being then employed to paint portraits, and also decorations, in colour and monochrome, for the houses at Houghton, Wanstead, Rainham, and Stowe, and Kensington palace.

In March 1726 he was appointed master carpenter of all his majesty's works and buildings, succeeding T. Ripley; and June 1735 master mason, succeeding N. Dubois (receiving £200 per annum in 1743), which office he retained at his death. He was also made keeper of the pictures, and after the death of C. Jervas, principal painter to the crown, the whole offices, including a pension of £100 per annum, which was given him for his works at Kensington, produced £600 a year.

The following works by Kent are placed in an approximate order of execution. 1714-27, additions at Kensington palace for king George I, comprising the cupola room, the king's great drawing-room adjoining, and the grand staircase; painting the walls and ceilings and other ceilings therein, such as the presence chamber (in imitation of the Pompeian style, then just discovered); while for Caroline (1727-37), queen of George II, he was consulted with C. Bridgman (to whom it is sometimes entirely attributed) as to laying out the 300 acres of ground taken from Hyde-park (PYNE, *Royal Residences*, 4to., London, 1819, ii, pp. 21-2, 33-5, 72-4). For the royal family he designed the residence at Kew (partly taken down 1802), and painted the ceilings of the cabinet, drawing-room, and great staircase, designed some chimney pieces, and the ornaments of the gallery: plans, etc., are given in CHAMBERS, *Kew Gardens*, fol., London, 1763. At Rainham, Norfolk, for Charles, second viscount Townshend, he modernized (1714-60) the mansion, altering the principal apartments, adding a wing, and forming the lake for two miles in extent, thus "eclipsing Houghton, the standard house of that day." About 1729, he designed No. 17 Arlington-street, Piccadilly, for Sir R. Walpole (now occupied by the earl of Yarborough) who described the great room as "remarkable for magnificence;" Wakefield lodge, Northamptonshire, for the duke of Grafton (NEALE, *Seats*, iii); and No. 44 Berkeley-square for lady Isabella Finch (now occupied by C. Baring Wall), the staircase and saloon are highly commended.

Holkham in Norfolk appears to have been commenced from the designs of Thomas Coke, earl of Leicester, himself, (1729-64) assisted by lord Burlington; the details being worked out by M. Brettingham; but the great hall is attributed solely to Kent; Sir W. CHAMBERS (*Civil Architecture*, 8vo., London, 1825, pp. 349, 363, 391), states that "Kent was the designer of this building," which was published in *Plans*, etc., fol., London, 1761; and with *ceilings, chimney pieces*, etc., 1773, the description in the latter edition mentions the respective shares Kent and Brettingham had in the design. The bridge, the temple, and the great gateway, are also by Kent. DALLAWAY, *Anecdotes*, 8vo., London, 1800, p. 149; WOOLFE and GANDON, *Vit. Britt.*, fol., London, 1771, ii, pl. 69, 70; NEALE, *Seats*, iii. This building has been greatly praised in CIVIL ENGINEER, etc., *Journal*, 1841, iv, p. (179), 231, with a reference to ELMES, *Annals of the Fine Arts*, 8vo., London, 1820, v, p. 58-70, for an able piece of architectural criticism on it. As lord Burlington built his villa at Chiswick in 1729, Kent may be presumed to have assisted him in

that, as well as of some others of the designs mentioned *s. v.* BOYLE.

In 1733 he designed the decorations to the chapel in S. James's palace for the marriage, 14 March, of William prince of Orange: a print is in the king's collection at the British Museum: there is also an engraving of "His Majesty's new building near Whitehall, intended for the Treasury, etc., as designed 1734 by W. Kent; Gug. Kent, arch. et pict., inv. et des.: P. Fourdrinier, sc.," only the centre part (7 windows out of 15 in a row) was executed by 1742 (it looks along the parade in St. James's park); a reduced copy of the façade is given in *BUILDER Journal*, xv, 419: also a print of the section of the library in the Green park for queen Caroline, finished 29 Oct. 1737, 60 ft. long, 30 ft. wide, and 30 ft. high; it was on the site of Stafford house: and 1734, he designed Devonshire house, Piccadilly, for William Cavendish, third duke of Devonshire, after its destruction by fire 16 Oct. 1733; it is said to have cost £20,000 exclusive of £1,000 presented to the architect by the duke; the portico is a late addition. CUNNINGHAM, *Handbook*; WOOLFE and GANDON, *Vit. Brit.*, fol., London, 1767, i, pl. 20-4. In 1735 was published by RIPLEY, *Plans, etc., of Houghton, in Norfolk*, fol., London, 1735, and again in 1760, in which are given thirteen plates of ceilings and chimney pieces by Kent. At Stowe, Buckinghamshire, for the duke of Buckingham, he added the south Ionic pavilions (altered by Borra); Congreve's monument, 1736; the hermitage; the temple of Venus on the bastion; the two gateways into the courts by the north front of the house; the gateway on the hill (altered and extended by Valdré); the Ionic rotunda or temple of Ancient Virtue; the temple of British Worthies; the temple of Concord and Victory, after the measurements of the *maison carrée* at Nîmes (finished by Borra 1763); the queen's buildings (portico added 1789); and painted the ceiling of the entrance hall, 36 ft. by 26 ft. 9 ins. STOWE, *A description*, etc., 8vo., London, 1838; SEELEY, *Beauties of Stowe*, 8vo., 1769, new edit.

The range of buildings on the east side of the old Margaret-street, Westminster, and now containing the law courts, were designed by Kent for holding the records of parliament; the centre and southern wing are shown completed in MALTON, *London and Westminster*, fol., London, 1792, pl. iv. J. Wyatt probably added the northern wing to correspond in 1813; and part of the south wing was taken down by Sir C. Barry in 1850. This edifice may have been occasioned by the inquiry in 1739, when Kent, with the architects at the Office of Works, were directed by the Lords Commissioners of the Treasury to prepare designs and estimates for erecting a new building for "the reception of Parliament." The designs received their approbation and that of Mr. Speaker Onslow; the estimate was £167,067. The whole of the drawings were, in 1835, in the possession of L. N. Cottingham; BRAYLEY and BRITTON, *Palace*, etc., 8vo., London, 1836, p. 395. The design is stated to be by Kent and Ripley, in No. 759 of READ'S *Weekly Journal*, 27 March 1739. He also designed the Horse Guards; the façade to Whitehall being the design of J. Vardy: the whole was executed between 1742 and 1752; WOOLFE and GANDON, ii, pl. 8-9; GWYN, *London and Westminster Improved*, 4to., London, 1766, p. 127, comments on this work. For king George II he made a design for a palace to be erected in Hyde park; the model still exists in that king's "closet adjoining his private chamber" at Hampton Court palace.

His minor works comprise, 1741, the choir screen at Gloucester cathedral (removed 1820); 1746, the temple or banqueting house at Euston hall, Suffolk, for Charles, second duke of Grafton; 1748, Wimpole church, Cambridgeshire, for lord-chancellor Hardwicke; Escher in Surrey (Gothic), for Right Hon. Henry Pelham, secretary at war, a plate exists of the building which is now pulled down: pulpit for York cathedral, plate by J. Vardy; 1749, "interior of Henry VIII's chapel at Hampton Court, for reception of foreign ambassa-

dors", plate by W. Kent and J. Vardy, del. et sculp.; a screen (Gothic) forming the Court of King's Bench in Westminster hall, a plate exists; and four tombs in Westminster abbey, namely, after 1720, the honorary memorial to earl Stanhope, carved by Rysbrach; its companion, after 1726, to Sir Isaac Newton, also by Rysbrach, at a cost of £500; Feb. 1741, that to Shakespeare, executed by Scheemaker; and that to George Monk, duke of Albemarle: these are all well shown in ACKERMANN, *Westminster Abbey*, 4to., London, 1812.

Kent edited and published at the expense of lord Burlington, *Designs of Inigo Jones, with some additional designs* (by his lordship and by himself, pl. 63, etc.), 2 vols., 136 plates, fol., London, 1727, from drawings by H. Flitcroft and himself. This work was republished with an additional plate by the latter, 1770; and reprinted by Nichols, fol., 1835. VARDY, *Inigo Jones and Kent's designs*, gives 53 plates of decorations, furniture, etc., fol., Lond., 1744. His portrait after W. Aikman, was engraved; a reduced copy is given in WALPOLE, *Anecdotes*, edit. 1826-8; and his signature is in British Museum, Addit. MS., 20,101, fol. 25. He died at Burlington house 12 April 1748 of inflammation in the bowels, in his sixty-fifth year, and was buried at his own desire in his lordship's vault in the chancel of Chiswick church. His fortune amounted to about £10,000. *BUILDER Journal*, 1862, xx, p. 563; LYSONS, *Environ*, 4to., London, 1795, ii, 214; WALPOLE, *Anecdotes*, edit. 1862, p. 776.

"To the taste of Kent must be attributed the first introduction of good antique ornament in architecture, as well as adapting it to the manufactories of plate and cabinet work, which he designed for queen Caroline, as shown in Vardy's work. The furniture at Houghton and other houses was chiefly from his designs. The prevailing taste at the period being in the French style of Meisssonier, notwithstanding Kent showed his judgment in reforming the prevailing fashion, yet it was some time before it was adopted in England and still in France," MULVANY, *Life of Gandon*, 8vo., Dublin, 1846, p. 266. The chimney piece of Egyptian granite in the hall, now the dining-room at Easton Neston, Northamptonshire, for lord Lempster, is another of the many such works already noticed. Kent has always been considered as the inventor of modern landscape gardening, the father of the so-called English style of laying out pleasure-grounds. (WALPOLE, 781; and FELTON, *Portraits of Authors on Gardening*, 8vo., Lond., 1830, 2nd edit., p. 132-5). He designed 1734 those at Carlton house for Frederick, prince of Wales, together with a cascade; the grounds at Rainham, Claremont, and Escher; and was consulted on those at Holkham, Wanstead, Livermore in Suffolk (for the duke of Grafton), and other seats. He likewise designed the vignettes for the first part of Tonson's edition of GAY, *Fables*, 4to., London, 1727; for vol. ii of the large edition of POPE, *Works*, fol., London, 1735; and the plates for the edition by Birch of SPENSER, *Faery Queen*, 3 vols., 4to., London, 1751.

John Kent (who may have been a relative) was appointed 17 August 1738 by king George II to the care and maintenance of the royal gardens at Windsor and Newmarket, consisting of 6 acres, 3 roods, 16 poles at £15 per acre per annum, succeeding C. Bridgman: *BUILDER Journal*, xxii, 586-7.

KENTISH RAG STONE. A very hard and compact grey coloured limestone, much used for ecclesiastical buildings. It is found in strata alternating with Hassock; and is a sort of indurated variety of the green or Shanklin sand formation immediately underlying the escarpment of the chalk and reposing upon the Wealden clay. The district in which this stone is quarried extends about 30 miles east and west through the central part of the county of Kent, principally near the banks of the river Medway, the town of Maidstone being the chief depôt. It is used to the greatest advantage in large blocks of from 3 cwt. to 3 tons each, but it is also extensively used for church building in random courses or in random work

with stones of much less size. A cubic foot weighs 166 lbs. 10 oz. On account of its hardness it is generally worked by the scappling or skiffing (as it is called in Kent), or knobbling (near London and in west of England) hammer; and for the same reason the quoins, strings, tracery, etc., are generally of freestone. An analysis (by Phillips) shows that this rag stone is composed of

| | | |
|--|---|------|
| Carbonate of lime with a little magnesia | - | 92.6 |
| Earthy matter | - | 6.5 |
| Oxide of iron | - | 0.5 |
| Carbonaceous matter | - | 0.4 |

100.0

The principal quarries are:—the Iguanodon and Preston-hall quarries at Maidstone and Aylesford; the Broughton quarries near Maidstone; the Allington Quarry and Brick Company, Maidstone; Perry-fields and Throat-wharf quarries, Maidstone; and the Aylesford quarries: there are also several smaller quarries in the neighbourhood. WHICHORD, *Observations on Kentish Ragstone*, 8vo., London, 1846. GODSTONE; HASSOCK; RAG STONE.

J. W.

The late C. H. SMITH, in a letter to the Institute of British Architects 15 January 1855, noticed that this material may be obtained as far westerly as Tilburstow-hill, near Godstone in Surrey. The softest sand rock of Tilburstow quarry may fairly be considered identical with *hassock*; and the harder varieties when removed from the quarry, could probably not be detected from the stone supplied from the central district. A new aisle on the south side of Godstone church was built with this stone about 1852.

KENTISH TRACERY. This term is noticed in TURNER and PARKER, *Domestic Architecture*, 8vo., London, 1853, ii, 285, in the description of Leeds castle, Kent, "a valuable specimen of the military architecture of the fourteenth century;—there are some good windows to the chapel, with geometrical tracery of the form usual in Kent, of similar character to the chancel at Chatham. The jambs are, however, earlier than the tracery, which was restored after the windows had been blown in by a hurricane, 7 Edward II, A.D. 1314." A note adds, "The present owner of the property, C. W. Martin, esq., has a careful transcript of the deed in which these windows are mentioned, from the 'Inquisitiones ad quod damnum, 7 Edw. II, n. 15, m.' in the public records. This date fixes the age of the class of windows to which this specimen belongs, which is of similar character to Chatham, Penshurst, Mayfield, etc., often called 'Kentish tracery'."



The above illustration of a window in Chartham church, Kent, is from RICKMAN, *Attempt*, etc., 8vo., London, 1848, 5th edit. BRANDON, *Analysis*, etc., 4to., London, 1847 (Decorated, pl. 22), gives one of the smaller windows therein; DOLLMAN and JOHNS, *Analysis of Ancient Domestic Architecture*, 4to., London, 1861-4, pl. 15, illustrates the window at Mayfield palace.

The character of the design is much like that of the French and Flemish *rayonnant*, and was probably designed by some

foreign architect, or by one who had travelled for the purposes of study. A portion of the cloisters in Westminster abbey bear a strong resemblance to this style.

A. A.

KERAMIC MANUFACTURE, see CERAMIC.

KERB, see CURB.

KERBELA. A town in Asiatic Turkey, south-west of Bagdad. It is surrounded by a wall upwards of two miles in circumference, with five gates; it has seven caravanserais; and two magnificent mosques, one including the presumed tomb of Hosein, son of Ali (died A.D. 680), erected by the first sultan of the race of the Bovidés, and called by him in Persian "Kunbud Faiz", or magnificent dome, now commonly called in Arabic, "Meshed Hosein"; OCKLEY, *History of the Saracens*, 8vo., London, 1848, p. 415, *et seq.* This mosque, together with the scarcely inferior Meshed Abbas, is noticed in BUILDER *Journal*, 1846, iv, 45, from a communication by Lottin de Laval, who had then recently explored this 'sacred' city. The Hosein mosque has a gilded cupola, and is an object of great veneration to the Persians, who make pilgrimages to it in great crowds; numbers of the dead are there interred, the district being held sacred.

KERF. A saw cut; see CURF.

KERKIS, see CERCIS.

KERMES LAKE. An ancient pigment, perhaps the earliest of the European lakes. The name is supposed to be derived from Kerman, the ancient Carmania, at the entrance to the Persian Gulf.

KERNEL, see CRENELLE.

KERSANTON STONE. A black stone obtained from quarries at Folgoet, near S. Pol de Leon, in Brittany. When old and changed by the atmosphere, it becomes of a dark green colour resembling bronze. It is a good material for carving; all the foliage in the church of Notre Dame at Folgoet being as sharp now as when left by the chisel. The three altars are of the same material, richly carved in a series of panels with canopies, the slabs being in one piece of stone; NODIER and TAYLOR, *Voyage Pittoresque* (Bretagne), fol., Paris, 1845-6, ii.

KERWYNE (WILLIAM) or KERWIN, died 26 December 1594 and was buried in the church of S. Helen, Bishopsgate. The Latin inscription on a rich altar tomb records him as "of this cititie, Free Mason." The Latin epitaph is to the following effect: "The Fates have afforded this narrow house to me, who have adorned London with noble buildings. By me royal palaces were built for others. By me this tomb is erected for my bones." By his wife, who died 23 August 1592 he had three sons and two daughters. Probably Andrew Kerwyn, paymaster of the king's works, circa 1604, was one of the sons. Stow, *Survey*, fol., London, 1633, p. 180.

KESH WORK. The term given by country masons, employed in building rough stone bridges, to large baskets made of boughs and branches of trees, about 4 or 5 ft. square, which are sunk in rows with the weight of stone thrown into them, and are filled up until the water is about knee deep; timbers were then laid across, and the pier erected; the keshes being banked all round with other stones and hard stuff thrown in; SEMPLE, *Building in Water*, 8vo., Dublin, 1776, p. 59. KEEVE WORK is the next better process.

KESSEREAH. A village situated in the district of Hadjypoor, about twenty miles north of Bakhra, near to the river Gunduck, a tributary on the north of the Ganges. Near it is a singular conical brick building, called the "dewry of Bheem Sain", or Bhim Sinh. BURROW, in *Asiatic Researches*, 4to., Calcutta, 1790, ii, 477, who visited it about 1785, describes it as a cone 363 ft. in diameter at the base; the height of the frustrum carrying a cylinder 93 ft., the diameter of the cylinder 64 ft.; the height of the remains of the cylinder or round tower 65 ft.; the entire height being 158 ft. Both the cone and cylinder are constructed of well burnt bricks; those in the latter are of various sizes, many being two spans long and one broad; others are of the common size but thinner; the

mortar was little better than mud. It is not known whether it be hollow or not. BURROW conceived it to have been erected for the image of the god Mahadeo: it seems to be a gigantic LINGAM, or daghoba.

FERGUSON, *History of Architecture*, 8vo., London, 1867, ii, 470, notices, however, that "at Keseriah in Tirhoot, are the ruins of what appears to have been a very large tope; but it is entirely ruined externally and has never been explored; a view is given in ASIATIC SOCIETY OF BENGAL, *Journal*, 8vo., London, 1835, iv, p. 129, pl. vii. On p. 459 he also gives a cut of the capital of a Lât or pillar of Asoka, from one of three at the same place, standing near the river Gurdook.

KETTON STONE. This oolitic freestone is obtained from quarries formed in the lias formation, which are situated near Stamford, in Rutlandshire. The stone is of a dark cream colour with an admixture of yellowish spots, and very excellent in quality. It contains 92 per cent. of carbonate of lime, cementing oolitic grains of moderate size. Its cohesive power is greater than in any other oolite tried by the commissioners, the quantity of matter disintegrated being only 1 in 1340. The rag stone disintegrates rather more, but requires nearly four times the weight to crush it; and it is very heavy, weighing about 155 lbs. 10 oz. per cubic foot; the freestone weighs only 128 lbs. 5 oz. per cubic foot. THE BUILDING NEWS *Journal*, 1857, iii, 127, notices that some of the statues surmounting the buttresses on the north side of the nave of Westminster abbey are formed of this stone, and that after several hundred years they retain their original surface. Carlton Curliu hall, Leicestershire, completed 1636, and situated about twenty miles from Stamford, is an instance of a local use of it; and it has been very extensively used at Stamford, at Cambridge for three hundred years, Bedford, and Bury S. Edmunds; in the modern parts of the cathedrals of Peterborough and Ely; and 1831-3 in the upper portion of the church of S. Dunstan, Fleet-street, London.

Blocks from 1 ft. to 8 ft. in length, 1 ft. to 3 ft. 9 ins. in width, and 2 ft. 6 ins. to 2 ft. 10 ins. thick can be obtained and delivered for 2s. per foot at Ketton station. A bed 3 ft. 6 ins. thick is that called "rag." HELMDON QUARRY, CAMBRIDGE.

KETTIG (GERHARD VON) has been considered the same person as Gerhard von Rile, Gerhard (de Sancte Trudone) van Sint Troid, and the Magister Gerardus "lapicida" mentioned in a deed of 1257, in which he is further described as "rectori fabricæ nostre propter meritum obsequia nobis facta", and by which the chapter of Cologne cathedral gave to him the site of the "magnam domum lapideam" which he had previously built at his own expense: this house was given up to pious uses 1302, after the death of the father, by his daughter Elizabeth and his three sons, who had all entered monastic establishments: his wife's name was Guda. This deed is printed in BOISSERÉE, *Cathédrale*, 4to., Munich (1st ed. 1823), 1843, pp. 10-13, 109-11; who adds another dated 1296, in which G. de S. Trudone and his daughter Catherine are mentioned; and with these is another dated 1248, speaking "de area opposita quam ædificavit Gerardus lapicida tali conditione", the two last words appearing to refer to a clause for payment of ground rent. BOISSERÉE comes to the conclusion that Magister Gerardus and G. de S. Trudone are two people: he attributes to the former of these the execution of the foundations and great part of the basement of Cologne cathedral during the first nine years, 1248-57; he considers him to have been the "werkmeister vom dom", who is recorded amongst the founders and benefactors to the hospital of S. Ursula at Cologne; and also to have been that master of the works of the cathedral who is supposed to have given the plan for the church of the abbey at Altenberg, where the first portion (the choir) was built 1255-65, because the plan resembles in some respects that of Cologne cathedral; and to have directed the works at the church of the Minims at Cologne, consecrated 1260, because it is said to

ARCH. PUB. SOC.

have been erected by the workmen of the cathedral out of hours.

The claim for Albrecht Groot (Albertus Magnus) 1205-82 to be considered as at least the designer of the plans for the above named buildings has been partially abandoned of late years in favour of an Henricus (perhaps Henricus de Soynere or Sunere) to some extent, but generally of a Gerhard with one or more of the varying descriptions stated at the head hereof. BOISSERÉE was the first to observe that Henricus is not mentioned otherwise than as "petitor structuræ", whatever that may really mean. FAHNE, *Diplomatische Beiträge*, Cologne, 1842, is stated to have produced certain documents inducing the belief that the three names above printed are those of the same person who 1254-95 directed the works of the cathedral, but the publication is not accessible. PASSAVANT, *Kunstnachrichten aus Belgien und vom Niederrhein*, at the end of his *Kunstreise*, etc., 8vo., Frank.-s.-M., 1833, p. 425-30, gives the document of 1257, apparently from BOISSERÉE. It is remarkable that OTTE, *Kunst-Archæologie*, 8vo., Leipzig, 1854, p. 171, calls Gerhard "magister artium".

KEÜPEN STONE. A stone of a grey colour said to have been used in the building of the original tower of S. Mary's church at Taunton, the carved work having been executed in the warm coloured Ham Hill stone; the two forming an agreeable contrast. The quarry is situated a few miles from the town; *BUILDER Journal*, 1858, xvi, 284.

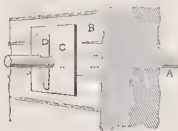
KEUR (WILHEM) was born in the sixteenth century at Gouda. GUICCIARDINI, the historian, is stated to mention him as one of the first architects of his time. 24.

KEVEL. A large hammer. It is noticed (as a kevell or kywell) 1348, 1360, and 1368, in SURTEES SOCIETY, *Fabric Rolls of York*, 8vo., Durham, 1859, p. 345. SMEATON, *Edystone Lighthouse*, fol., London, 1793, p. 62, describes the kevel as "a tool which is at one end a hammer and at the other an axe, whose edge is so short or narrow that it approaches towards the shape of a pick; the mason by a repetition of sturdy blows soon reduces a piece of stone by his eye to the largest square figure which it will admit. The face of the hammer end is not flat, but hollowed according to the portion of the surface of a cylinder; this gives a keen edge to two of its opposite sides that are parallel to the handle; and by this means biting keenly upon the stone, brings off a spawl or large shiver. The edge at the pick end is about half an inch in breadth." CAVIL.

KEY (Gr. *κλεις*; Lat. *clavis*; It. *chiave*; Sp. *llave*, *clave*; Fr. *clef*; Ger. *schlüssel*). The instrument with which a lock is opened or fastened. The form depends entirely on the construction of the lock itself, its general principles, wards, tumblers, etc. The handle is usually pierced; but in a very few instances the interior is merely sunk for the purpose of containing a coat of arms, scratched in the metal, or inserted in enamel. CUMING, *History of Keys*, in *Journal of British Archaeological Association*, 8vo., London, 1856, xii, p. 97, 118.

It is also the name for the handle of a T shape to a BIR-COCK: a long handle acting like a lever is called a 'spanner'.

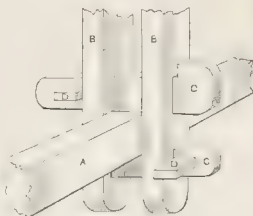
KEY. A sort of pin used to secure an iron tie-rod, or bar, when it is desirable to avoid the expense of a nut and screw. Into a hole cut in the



rod lengthwise at one end, an iron wedge or key is driven (an iron washer is generally placed against the wall, timber, or other substance intended to be tied in), till the whole is sufficiently tightened up. In the figure, a is the tie-bolt; b the face of the wall; c the washer; and d the key. The wedge is sometimes split at the end (Fr. *clavette*) which then springs outwards, preventing its slipping out. This form of key is sometimes called a 'cotterell' or 'cotterall', fitting into the 'cottar' or opened head of the rod.

A. A.

In carpentry, each end of a bar of wood may be fastened with a key or wedge passed through a key-hole. The accompanying figure is taken from *Voirier le Duc, Dict.*; A, the tie or collar beam of a roof; B B, the suspending rods (Fr. *moise*); C C, the bolt (Fr. *clef*); and D D, the key (Fr. *clavette*), which may be a pair of wedges. The use of the key sometimes seen in new joisting, is derived from old work where it frequently occurs as a pin, at the end of a trimmer as to a well hole, especially when the trimmer is housed into the joist.



The term "keying a scarf" is a method of tightening up a scarf by driving in reversed wedges or keys, as shown at A in the wood cut.

A. A.

KEY. A term defined by old writers thus: "in naked floors keys are pieces of timber fixed in between the joists by mortise and tenon. When these are fastened with their ends projecting against the sides of the joists, they are called strutting pieces." This definition is anything but clear: what is probably meant are small pieces of timber fixed between joists at intervals, to which to nail the floor boards when it is necessary they should be laid the same way as the joists, as is sometimes the case when the latter run some one way and some another in a room; or to bind two joists together for supporting the cill of a partition running parallel to them, but not upon them. This 'key' may perhaps be defined simply as solid strutting pieces housed in.

A. A.

It is also a piece of stuff, dovetail in section, driven into a corresponding groove cut across any glued-up stuff, as the under side of a table top, dresser top, drawing board, dado, or any other work where there is fear of the stuff winding on face, or of the glue joint giving, or opening by shrinkage. It is much better for this purpose than a clamp, which does not shrink in length, while the boards forming the table top will do so in width. In



fact, clamps often cause the glue joints to open; and their ends project if the boards shrink ever so little. Keys should be cut tapering, so that they may be wedged up if they shrink; and be fixed reversed the more to equalise the pressure. **CLAMP.**

A. A.

An upright "key grooving or slotting machine" is given in *Buchanan, Millwork*, 8vo., London, 1841, pl. 34.

KEY. The rough surface of brick, stone, or other material, the interstices of which being entered by the beds of mortar, or coats of plaster in its soft state, cause a sound adherence of one material to the other. If a wall be too smooth to receive cement, it must be hacked to form a key.

It is also the connection formed in a similar way between one coat and another, the under coat being well scratched over while wet to afford the means of running the plaster of the new coat into the interstices and under cuttings and so forming the key for it. For good work this is very essential, or the coats may become separated from one another; *Civil Engineer Journal*, viii, 313.

In plasterers' work, it is that portion of the stuff (A), which is forced between the laths (B) of a partition or of a ceiling; by bulging out it holds the plaster in its place. If the laths are nailed too close, there is not enough key, and the back pieces break off and let the face work fall down on any strong vibration occurring.

A. A.



KEY COURSE. The name of a course of stones fulfilling the duty of key stones.

KEYED AND BUTTONED. The term given to the process of joining wide architraves, as described *s.v.* **BUTTON.**

KEYES (ROGER), fellow 1438, warden 1442-45, is said to have been 'surveyor' at the completion of All Souls' college, Oxford, 1444, as noticed *s.v.* **DRYELL**, whom he succeeded. He went (A'Wood states) from Oxford to Eton. King Henry VI nominated Keyes in 1441 "master of the works of his college" at Eton, with a salary of £50 per annum by his Will; **TIGHE** and **DAVIS**, *Annals of Windsor*, 8vo., London, 1858, i, 335. In 1449 for the services which "our beloved clerk Roger Keys in many and divers ways renders and will in future render to us, as well in our operations connected with the building of our royal college of S. Mary, Eton, as in other respects—and Thomas Keys his brother—we ennoble", etc.; as recorded in the patent of 19 May, 27 Henry VI; **BENTLEY**, *Excerpta Historica*, 8vo., London, 1831, p. 45-49. In 1469 he was chanter of S. Peter's church, Exeter, and gave many books in that year to Exeter college, Oxford.

KEYHOLE (Lat. *seræ foramen*; It. *bucco della serratura*; Sp. *ahugero de la cerradura*; Fr. *trou de la serrure*; Ger. *schlüssels-loch*). The hole cut in a door, gate, drawer, etc., to permit the key to be put into the lock itself. It should be a



little larger than the key to permit it to pass easily, and is generally protected from wear by an **ESCUTCHEON**, or if desired to keep out dirt by a **DROP ESCUTCHEON**. Keyholes are generally made by boring a hole through the door with a shell bit at top and bottom, and cutting the sides out with a keyhole saw.

A. A.

KEYHOLE SAW. The saw used for the above purpose. It resembles a turning saw but it is narrower and finer in the tooth, and is secured by being screwed into a socket on the end of a movable handle. It is also very serviceable for any cutting in which the curves are too quick for the width of the turning saw: it is called a "twining saw" in the country.

A. A.

KEYLESTEDS (WILLIAM DE), *cementarius*. The agreement, 1321, made between him and John de Derlegh to pull down and rebuild Darley hall, Derbyshire, exists in the British Museum, Add. MSS. 6670, p. 293, 304; 6702, f. 89 b; 6707, p. 81: the house was pulled down 1771. In 1817 this contract was in the possession of A. Wolley of Matlock; *Lysons, Mag. Britt.* (Derby), 4to., London, 1817, p. 98.

KEYLEY (JAMES) was paid 4 Sept. 1495, "£10:1:0 for king Richard (III) tombe", who was buried in the Grey Friars church, Leicester; Privy Purse Expenses of Henry VII, in *BENTLEY*, *Excerpta Historica*, 8vo., London, 1831, p. 105.

KEYNSHAM STONE. This material is obtained in the deposits situated at Keynsham, near Bristol in Somersetshire, which produce blue lias limestone, gypsum, clay, and other substances. The blue lias stone, weighing 169½ lbs. per ft. cube, is stated to produce hydraulic lime of the finest quality, the average thickness of the measures being 45 ft.; a bed furnishing lithographers' stone is 6 ft. thick: *BUILDER Journal*, xx, 194.

KEYSER (HENDRIK VAN), son of Cornelis, a cabinet maker, was born 15 May 1565 or 1567 at Utrecht. He studied sculpture under C. Blommaert, and was appointed 1594 architect and sculptor to the city of Amsterdam. He there designed 1608-13 the *borse* or exchange, 250 ft. long and 140 ft. deep; and 1615-18 the Haarlem gate, now both destroyed; also the South church with a tower: 1620-31 the West church with two towers; and 1620-23 the North church: these buildings have been attributed to **DANCKAERTS**, who probably built and finished them (some writers consider that the latter designed them and Keyser was employed on the decorations): the French Protestant church: and four towers (some if not all since destroyed), called the Mint, Jan Roompoorts, or Jan Roodenpoorts tower; the Regulierspoort (this has been attributed to J. H. Koeck); de la Croix; and de Montalban, all decorated

with the orders of architecture. At Delft, he designed the *raedthuis* or town-hall, the façade being 84 ft. long; with the marble mausoleum, completed 1620, of William I, prince of Orange, in S. Catherine's church; this work is considered his masterpiece, the statues and ornaments being finished with great minuteness; it cost 29,000 florins. A view is given in GOETGHEBUER, *Choix des Monumens*, fol., Ghent, 1827, pl. 90, p. 61. The statue of Erasmus at Rotterdam is attributed to him. He died at Amsterdam 15 May 1621, aged 54 or 56 years, but "in 1620 aged 56 years" according to COMMISSION D'HISTOIRE DE BRUXELLES, *Bulletins*, 8vo., Brux., 1848-49, xiv, p. 62, 573; xv, 209. A full biography edited by C. KRAMM, was given in the *Tijdschrift van Geschiedenes, Oudheden, en Statistiek den Utrecht*, 1836, p. 305. Many of the buildings are engraved in DANCKAERTS, *Architectura Moderna*, fol., Amst., 1631, which is attributed to Keyser by some authors. A son, and Nicholas Stone of London, were pupils.

24. 101. 116.

KEYSER (PIETER VAN), second son and pupil of Hendrik, succeeded him in the office of architect and sculptor to Amsterdam. Only the tomb of count Wilhelm Frederick (or Wilhelm Louis) of Nassau 1642 at Leeuwarden; and the marble statues and bas-reliefs on the tomb of admiral Tromp in the old church at Delft, are attributed to him. The former is engraved in VOIT, GUHL and CASPAR, *Denkmäler der Kunst*, fol., Stuttgart, 1845-56. Thomas, another son, a painter, is said to have assisted his brother. The Zeegh Boog-ligen at Amsterdam is given in pl. 44 of DANCKAERTS as by Pieter.

24. 101. 116.

KEYSTONE (Lat. *clavis arcus*; It. *chiave d'un arco*; Sp. *clave*; Fr. *croisette*; Ger. *schlussstein*). The wedge shaped block or centre voussoir of an arch constructed of stone. It is intended to be the instrument to *lock* the whole together. When all the lower parts of the arch have been turned, the keystone is inserted and driven down till all is tight, but no more, for if driven too hard it is likely to start the voussoirs at the haunches. The last brick placed in the crown of a brick arch keys the ring in like manner, and requires to be as carefully placed. As this material is not usually formed of a wedge shape, the top of the joints to a small arch are often filled in with a bit of tile or slate to equalise the pressure. A block of iron as a substitute for a keystone, was a patent obtained by — Burden, who is said to have designed the Sunderland bridge. They measured 5 ft. 2 ins. in the widest part, and 4 ins. in thickness, being in the form of a sort of framework; they weighed only 4 cwt., and were fixed together with pins and bars of iron.

2.

The following rule is put forward for determining the depth of keystones in semicircular or segmental arches. It corresponds in its result with the most celebrated examples of bridge building; and, with good varieties of the stone used, is perfectly safe for all spans, from a semicircle to the flattest segment. Let r represent the radius of curvature of the arch, n the coefficient for the kind of stone, and d the depth of key, all in feet and decimals; then $d = n\sqrt{r}$.

The values of n ; granite = .24; sandstone .36; compact limestone .42; brick .50.

Examples. 1. The bridge over the Dee at Chester has a span of 200 ft.; rise = 42 ft.; radius of curvature = 140 ft.; and depth of key = 4 ft. By the rule— $.36\sqrt{140} = 4$ ft. 3. ins.

II. Pont-y-Prydd, over the Taaf:—Span = 140 ft.; rise 25 ft.; radius of curvature = 87.5 ft.; and depth of key = 3 ft. The rule gives— $.36\sqrt{87.5} = 3$ ft. 4 ins.

III. A road-bridge:—Span = 30 ft.; rise = 10 ft.; key = 1 ft. 9 ins.; and radius of curvature = 16 ft. By the rule— $.42\sqrt{16} = 1$ ft. 9 ins. In the two first examples the formula gives a result somewhat in excess of what have been actually constructed, but it must be remembered that they are considered as bold examples, which should not be adopted without

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caution by the general practitioner; HURST, in the *BUILDING News Journal*, 1857, iii, 318.

Keystones in good work are generally carved where the faces project; sometimes merely as rough rustics; or with foliages; but more commonly with heads often called masks. In the better age of Italian art, heads carved as keystones had generally a character in accord with the purpose or position of the building; those, for example, at Somerset house, represent river gods, the building being on the bank of the Thames, while the head of Neptune would be appropriate to the original purpose of the portion belonging to the navy department. The good character of some keystones over doorways to London houses at the end of last century, may be attributable to superior men like Bacon or perhaps Wilton, who, such was the slender encouragement of art at that time, may have been glad of this means of increasing their income by executing work of this subordinate nature, by carving them in stone, or modelling them for terra cotta. Probably Sir W. Chambers set the fashion as in the fine examples at Somerset house above noticed. Another instance, is the keystone of the archway in London-wall leading to Carpenters' hall, which has a fine head of Inigo Jones carved by Bacon. It is noticeable that the flat arches to the basement windows of the Banqueting house at Whitehall by Inigo Jones, have a centre joint and therefore no keystone.

s. s.

Examples of richly sculptured keystones to triumphal arches are shown in TAYLOR and CRESY, *Rome*, fol., London, 1821-2. The graceful keystone, as it was long called but now considered to be a bracket, of white marble, rather more than 3 ft. in height, in the Townley collection in the British Museum, is shown in SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE, *Townley Gallery*, 8vo., London, 1836, ii, 86-7; it was obtained with other fragments from Frascati near Rome. The keystones to the arcades of the amphitheatre at Capua have heads in high relief, of the divinities to which it appears to have been dedicated.

2.

In Gothic work, although it is said that pointed arches have a central joint and therefore no keystone, this is only true with regard to large constructional arches, and in some of them there is a key with sculpture. In groined work the keystone locks the cross ribs, and is usually carved more or less richly; it is then called a 'boss'. In fan tracery groining, the spandril is frequently locked by a rich pendant. The boss is sometimes hollowed out to admit a rope or chain passing through it. Nicholas Kervor (or carver) pro pictura ix keys, xxs.; was paid 20s. for 60 'knots'; and 4d. each for 230 'keys' or bosses; as mentioned in Durham cloister roll, 1415 to 1418; RAINE, *S. Cuthbert*, etc., 4to., Durham, 1828, p. 156; and *A Brief Account*, etc., 8vo., Newcastle, 1833, p. 88.

KHALANA or CULNA. A town situated in the province of Bengal on the river Hooghly, near Calcutta, in Hindostan. It is chiefly remarkable for a circular area composed of two concentric circles; the outer one containing 108 temples, and the inner one 35. There is a flourishing school and mission station in connection with the Free church of Scotland.

50.

KHALAT EL HASSAN. A fort of considerable magnitude, situated about a day and a half's journey from the coast, between Antioch and Aleppo in Syria. It is placed on a hill and was built about the time of the Crusades; there are still existing moats, drawbridges, a portcullis, castellated towers, corridors, dungeons, etc., without end; the church in a tolerable state of repair; and a few tombs of the Crusaders; WELLSTED, *Travels—Caliph*, 8vo., London, 1840, ii, 76.

KHAN. The general name in Turkey for the Persian CARAVANSERAI, but at the latter food is not supplied. The khans are generally built in towns, and are used by foreign merchants not only as lodgings but occasionally as a magazine for goods, as chambers can be hired. Of this nature were the establishments provided in the principal continental cities by the Hanse towns; such as that called the Maison Hanséatique

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des Oosterlingues (the Easterlings of old English writers) which still exists at Antwerp and is popularly said to contain three hundred chambers wherein merchants from the Hanse towns were lodged gratuitously, besides having the right of storing their goods in the building.

PARSONS, *Travels in Asia and Africa*, 4to., London, 1808, p. 43, notices that the present town of Latachia "consists of modern buildings entirely of stone, and many large and handsome houses, with noble and capacious *khans*, or *caravanseras*, to receive passengers and merchandise; these buildings are mostly square, with a large area within, round which are magazines or warehouses, with a gallery running all round, which leads to the lodging rooms; most of these galleries are supported by such granite pillars as they happen to find nearest the spot. These *caravanseras*, on the great roads, in Turkey were built by rich and charitable men for the relief of poor travellers; the rich always give a present on their departure, which not only serves to keep the building in repair, but to maintain those who have the care of them. The greatest part of the *caravanseras* in cities and towns of great trade, are built with a view of gain, and are let out, and goods received and delivered at accustomed prices: they are generally of similar architecture, with this difference only, that some are large and elegant, with trees in the area, and fountains of water continually playing, whilst others are plain strong buildings, and smaller."

TEXIER, *Arménie*, fol., Paris, 1842, ii, pl. 87, gives the plan and elevations of a *khan* at Deibid, octagon in form, of one arched story, having an open octagon court in the middle 171 ft. diameter, with buildings 40 ft. deep all round it; at each angle of the outer wall is a small circular bastion or tower. In COSTE, *Architecture Arabe*, fol., Paris, 1839, are examples of those at Cairo; in the smaller khans the central area was sometimes covered with a roof having an opening in the middle to admit light and air, or by an awning to exclude the sun's rays and heat. The lodging rooms are generally square with a dais or raised floor at the further end, on which the traveller places his mats and rugs, there sitting and transacting business and at night sleeping.

AVLIYA, *Narrative*, 4to., London, 1834, mentions, ii, 103, that about 1638 there were at Constantinople 565 *khans* for merchants, and 676 *khani mojerred* or khans for single men, and 997 *caravanserais*. The two largest khans were those of Kopreili Mohammed pasha, grand vizier to Mohammed IV (1655-87) near the poultry market, with upwards of 220 apartments; and that of Valideh Kosim, mother of Murad IV (1623-40) originally the palace of Jarrad Mohammed pasha, but rebuilt; it had 300 apartments, with a large tall "koshk" in one corner; a mosque in the centre: and stabling for 1000 horses and mules. Many smaller ones are named having 70, 80, 100, 120, and several 200 rooms: a few were occupied by special classes of merchants; or for the traders from special localities. He also notices (ii, 81), that those at Scutari were not all covered with lead, and that each had from 40 to 50 fire-places; the gates were shut with chains, and guarded by porters.

KHANKAH. The Turkish name for a great monastic establishment, of which AVLIYA (ii, 103), in 1638 records there were five hundred and fifty-seven in Constantinople.

KHARGEH (El) in Upper Egypt, see HEB.

KHATMANDOO, in Nepaul, see KATMANDU.

KHAYA SENEGALENSIS, mottled mahogany or African mahogany, obtained from Gambia, is a timber that does not splinter, and is therefore used for gun carriages, tables, cornices, etc.; it is considered applicable for all purposes in which hard and cheap wood of great size is required.

KHELAT, in Asiatic Turkey, see AKHLAT.

KHLAIG or KHLIG (GEORG) of Erfurt, *baumeister*, succeeded about 1485-95 Hans Buchsbaum in the direction of the works of the yet unfinished second tower at the church of S.

Stephen at Vienna. He died 1506. VON HORMAYR, *Wien, seine Geschichte und seine Denkwürdigkeiten*, 2nd Jahrgang, 8vo., Vienna, 1824, i, i, p. 48. HAUSER. 68. 92.

KHORSABAD, KHASTABAD, KHORTABAD, or KORSABAD, properly KHOURUSTABAZ. A village about fourteen miles to the north-east of Mosul in the pashalic of Mosul in Asiatic Turkey. It is remarkable for a mound in which an Assyrian building was first discovered, and in which the explorations, commenced in March 1843, have been most fully worked. The mound is about 975 ft. long from south-east to north-west, where the highest portion occurs; it breaks the north-west side of a rectangular enclosure 5,400 ft. wide on that side by 5,750 ft. on the south-west side, a small square space (not a mound) is attached to the interior of the wall; and there are traces of eight towers to the walls. The great mound is a mass of sun-burnt bricks placed in regular layers without any cement, unless clay was used, which originally was defended from the weather by a coating of stone blocks obtained from the neighbouring calcareous mountains. The surrounding wall, 48 ft. 9 ins. thick, consisted of a mass of unburnt bricks covered with a similar coating supported by a base of irregularly-shaped stones piled together without cement. The details of the discoveries given by BONOMI, *Nineveh and its Palaces*, 8vo., London, 1857, 3rd edit., 147-248, are chiefly taken from the explorer BOTTA, *Monument de Ninève*, fol., Paris, 1848-50 (translated by TOBIN, 8vo., London, 1850), and the comparison between the sculptures at Khorsabad and those at Nimroud by BONOMI, p. 347, *et seq.*, deserves mention. In the article ASSYRIAN ARCHITECTURE it is stated that Sargina or Sargon, a.c. 734 or 721, built the palace at this place; this is confirmed by the inscriptions communicated by J. OPPERT to the Paris Academy of Fine Arts; *Building News Journal*, 1859, v, p. 79; 103. The French excavations were resumed 1851 by Place, the successor of Botta (BONOMI, p. 440), who excavated what he called the *hareem*, having an external wall adorned with large rolls or reeds like half-columns, perhaps representing the trunks of trees, within a framework of timber, not coloured. The outer wall at Khorsabad had arched entrances for carriages and for pedestrians; a bull was placed at the front and back of the piers, and a giant between them; there was a sort of under arch of beaten clay, and an arch of blue bricks with winged figures pointing to an emblem. This place is remarkable for the early indication of the voluted capital of the IONIC ORDER, as figured in LAYARD, *Nineveh*, 8vo., London, 1849, ii, 273-4.

KIABOOKA, or Amboyna wood, see PTEROSPERMUM.

KIBLAH or KIBLEH. The Mahometan ritual requires that the face of the worshippers should, at the time of prayer, be directed more or less exactly towards the *kaaba* at Mecca. To indicate this direction, every mosque has a MEHRAB or *mihrab*, which is sometimes called the *kibleh*, a word meaning 'direction' simply. GIRAULT DE PRANGEY, *Architecture des Arabes*, 8vo., Paris, 1841, p. 25; 45; and 54.

KIEV, KIEW, KIEF, or KIOW. The capital of the government of the same name in Russia. It is situated on the river Dneiper, which is crossed by a suspension bridge having wrought iron chains with broad flat links: it has four principal openings each of 440 English ft., and two side openings of 225 ft. each; also a passage of 50 ft. on the right shore spanned by a swivel bridge; the total length is about half an English mile. The ways through the piers are 28 ft. wide and 35 ft. high to the semicircular arch; the platform is 52 ft. 6 ins. wide, the roadway 35 ft. wide. The works were first commenced in April 1848; the first stone laid in September; and the bridge opened in the autumn of 1852; it was designed by C. Vignoles, C.E., and cost more than 400,000 guineas, or 2½ millions of silver roubles, or about 11 millions of francs. A model to a scale of 1½", placed in the Crystal Palace at Sydenham, was destroyed in the fire 31 Dec. 1866. Another model was presented to the emperor of Russia 18 December 1849 by

Vignoles. *CIVIL ENGINEER Journal*, xiii, 1850, p. 45. A sketch is given in *ILLUST. LONDON NEWS*, 1850, xvi, 125.

The city consists of three towns, each with separate fortifications and suburbs. 1. Petschersk or the New Fort, besides the garrison buildings, contains several churches; the most remarkable one is that of S. Nicolas Thaumaturgus, of timber, standing near the tomb of the prince and saint Oskold, celebrated as having been converted to Christianity in Greece. Near it is the famous monastery of Petscherskoi built 1075, surrounded by a wall 3,300 ft. long. It is so called from *petschera*, a cavern, in which the monks dwelt before the monastery was built; it is said to have been hollowed out by S. Anthony, and contains a number of catacombs forming a kind of labyrinth filled with the bodies of about one hundred and eighteen of the Russian primitive Christians, for at Kiev Christianity was first introduced among the barbarous hordes of the steppes of Russia; and for a long time it was the recognized capital of all Russia. HERBINUS, *Religiōse Kijovienses Cryptae, sive Kijovia subterranea*, 12mo., Jena, 1675, with plans, etc.

11. Kiev proper is also regularly fortified. It contains the residence of the archbishop and the cathedral dedicated to S. Sophia, founded 1037 by the grand duke Yaroslav Vladimirovitch (1019-54) to commemorate a victory. It was executed by Greek artists; a portion still exists. The chief object of interest is the sarcophagus of its founder; it is of a bluish white marble, the ornamentation composed of birds and foliage similar to some works at Ravenna; it is the only one of the kind known in Russia. The church has nine aisles, the two outer ones being most probably additions. It is 185 ft. from north to south, and 136 ft. from east to west; the plan is given in FERGUSON, *Illust. Handbook*, ii, p. 980, from a local publication. Most of the houses in this portion belong to this church, and to the convent of S. Michael.

111. Podol, occupying the lower ground, is inhabited chiefly by the middle and lower classes, and is the commercial part of the city; it contains about twenty churches, the imperial palace, and the town hall.

Kief contained four hundred churches and eight great markets according to DITTMAR von Merseburg, the German annalist (died 1018): and it is called (cir. 1080) a second Constantinople by ADAM von Bremen; KELLY, *Russia*, 8vo., London, 1854, i, 50; who (p. 52, 65) states that the city was, after many disasters, completely sacked in 1169, and the seat of government transferred to Vladimir: it was nearly destroyed in 1201. There are in all thirty churches: the plan of the old one dedicated to S. Basil, built by Vladimir (981-1015) is given in FERGUSON, p. 979. The church of the Ascension was erected cir. 1100; that of S. Irene (p. 979) was founded by Yaroslav, the ruins still existing afford a good specimen of the smaller class of churches of that date. The streets are broad. A prison; a town and military hospital; S. Vladimir's university, founded 1833, and attended by fifteen hundred students; an academy; a gymnasium; an observatory; and a library of about 46,000 volumes, are the other chief buildings. 50.

KIGGELARIA AFRICANA, Candle wood. A wood of the Cape of Good Hope. It grows 12 ft. high to the branches, being 1 ft. in diameter; and being of a close texture is used for general work. 71.

KILDARE (anciently Cill-daíre, the cell of the oaks, or of the oak-wood). The capital of the county and the seat of a diocese of the same name, in the province of Leinster, in Ireland. Under the Church Temporalities Act, 3 and 4 William IV, the bishopric was annexed to the archiepiscopal see of Dublin, but its temporalities, with those held in commendam, were vested in the Ecclesiastical Commissioners. The town is completely decayed; the only attractions being the cathedral; the round tower; and the monastery of the Grey Friars. The cathedral, dedicated to S. Bridget, consisted of a nave, chancel, transepts, and a lofty central tower. It was erected by Ralph of Bristol (died 1232), the first English bishop who held the

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see. The chancel forms the present parish church, and has been so altered that it presents no feature of interest; the nave, north transept, and half the central tower on the north side, were reduced to ruins in 1641. The style is Early Pointed of a very pure type. The nave is divided into six bays by buttresses, which run up undiminished to the eaves; between them are tall lancet windows, which are covered externally by arches springing from the buttresses; internally these windows have molded arches supported by the molded capping of dwarf shafts which terminate a few feet from the springing in knots of carved foliage. The south transept contains a number of ancient mutilated monuments, several with effigies. About 90 ft. from the northwest corner of this building stands the round tower; WARE states it to be 44 yards high; MOLYNEUX 107 ft.; LEDWICH 110 ft., the latter dimension is perhaps correct. The conical capping has been replaced by battlements. About 15 ft. of the height is built of granite, now much worn and of great apparent age, laid in regular courses; from thence to within about 7 ft. of the sills of the attic windows the work is spawled rubble limestone mixed with some sandstone and granite; the attic story, which has a parapet, is of rude rubble limestone. This upper story has the unusual number of five windows; they are square-headed; the openings below them being angular-headed. The circumference is 55 ft. at 3 ft. from the ground level; the thickness of walling at the door sill is 4 ft. 2 ins.; there are five internal offsets. The doorway is 15 ft. from the ground, and to any practised eye it is a palpable insertion; unlike the doors of every other round tower, the jambs do not converge. It is composed of pieces of Romanesque arch moldings taken from some other building and put together in a very rude way; not only do the pieces not fit, but the doorway is quite unfinished and imperfect: PETRIE and others assert this door to be coeval with the tower. In the churchyard are portions of two stone crosses, and many sculptured relics of the cathedral. At the south side of the town are some remains of the Franciscan friary founded 1260 by Lord William de Vesey, which, however, present no features worthy of special remark: it was of small extent.

GROSE, *Antiquities*, 4to., London, 1791, i, p. 25, gives an inaccurate sketch of the cathedral described as the 'Grey abbey'. PETRIE, *Ecclesiastical Architecture*, etc., 8vo., Dublin, 1845, p. 208, gives the doorway of the tower; and WILKINSON, *Geology*, etc., 8vo., London, 1845, p. 75, a plan and section, which were reproduced in the *CIVIL ENGINEER*, etc., *Journal*, 1845, viii, p. 147.

R. R. B.

KILE (RISLE) was *baumeister* from 1377 of the Petri-thurm at Nordhausen. 92.

KILFENORA, the ancient Fenabore. A hamlet in the county of Clare, in the province of Munster, in Ireland. It was formerly the see of a bishop, supposed to be originally founded by S. Fachnan (died 664), or by others about the twelfth century; and with Ardagh was united to that of Kilmaloe in 1752. The cathedral, dedicated to S. Fachnan, is an ancient building comprising a nave, a chancel, and a massive square tower; it was in 1806 in good repair; in 1832 part was renovated and fitted up as the parish church. In the churchyard are two good stone crosses, and another one was removed to Clarisford near Kilmaloe.

R. R. B.

KILKENNY, *i.e.* the church of Canice or Kenny. The capital of the county of the same name, in the province of Leinster, in Ireland. It is situated on the river Nore, here crossed by two good bridges, one dating in the last century, and is irregularly built, but the houses are mostly formed of stone, several dating from the sixteenth century. The city comprises the 'High town' or modern part, and the 'Irish town' or borough of S. Canice, the old portion. It was the seat of the ancient see of Ossory, originally founded according to WARE at Seir-Kieran about 402 by S. Kieran, and translated to Aghaboe about 1052, and thence to Kilkenny in the

reign of Henry II. The see of Leighlin is now united with it. The cathedral, dedicated to S. Canice, was principally erected by bishop Hugh Mapleton cir. 1251-56, and completed by Geoffrey S. Leger cir. 1260-86. The roofs were covered with lead cir. 1324. The great tower fell cir. 1332. The windows of the choir were filled with stained glass by bishop Ledrede cir. 1354; some fragments remain. The tower was rebuilt by bishop David Hackett cir. 1460-78. This cathedral is the largest old church in Ireland after S. Patrick's and Christchurch, at Dublin, and is perhaps the most perfect and the best of the ancient cathedrals of Ireland. It is built entirely in the First Pointed style, the details very good; it consists of a nave of six bays, with aisles, choir, transepts, and side chapels, and a low central tower. The total internal length is 217 ft.; the breadth across the transepts 119 ft.; and across the nave and aisles 63 ft. 10 ins. The masonry is spawled rubble work, the dressings being of tooled work in limestone. The lancet windows in the side walls of the choir are semicircular-headed. This building having fallen into great decay, was restored by Sir T. Deane and Son 1863-6. The Lady chapel was rebuilt with the old stones. A considerable number of tombs exist. At 6 ft. from the south transept is the round tower in good preservation. It is 95 ft. 8 ins. high to the molding of the first course of the conical roof, which gives the inclination. The lower external diameter is 14 ft. 9 ins., the walls 3 ft. 3 ins. thick; the upper diameter is 11 ft. 7 ins., the walls 2 ft. 8 ins. thick, with the unusual number of six square openings in the top floor, each 1 ft. 5 ins. wide and 3 ft. high. The sill of the doorway is 9 ft. 4 ins. from the ground, 2 ft. wide, and 4 ft. 9 ins. high, with a circular head formed by three thorough stones. There are four small apertures for light in the height, which has eight internal offsets as if for floors. Upon excavating, wooden coffins containing human remains were found partly under the foundations of the tower.

The present parish church of S. John is a portion of the Augustinian priory of S. John the Evangelist, erected 1220 by William le Mareschal, afterwards earl of Pembroke. It has been sadly mutilated in the alterations, an interesting Lady chapel having been taken down for the existing erection. Fifty-four feet of the south side of the choir is a continuous arcade of lancet windows, the largest pier being only 9 ins. wide. There are several monuments and effigies of great interest. The church of the Dominican abbey dedicated to the Trinity, and commonly called the Black abbey, founded 1225 by William le Mareschal the younger, is now a Roman Catholic church; it consists of a nave with aisles, transepts, chancel and central tower. The present building is principally in the Second Pointed style; it has a fine east window of five bays, and other details of interest; and was restored 1859-62 by J. J. MacCarthy. The choir and tower alone remain of the Franciscan abbey erected in the early part of the thirteenth century; they are worth examination, particularly the First Pointed east window of seven lancets, divided from each other by piers so slight as to be rather mullions than parts of the wall. The castle, originally built cir. 1207 by William le Mareschal the elder, is now the seat of the marquis of Ormonde, having undergone many alterations and additions; but three circular towers of the original castle exist. The vaulting in the lower story possesses the peculiar interest of still retaining some of the wattle centering adhering to the mortar. WARE, *Antiquities of Ireland*, fol., Dublin, 1739; GROSE, *Antiquities*, fol., London, 1791; NEWENHAM, *Antiquities*, 4to., London, 1830; BELL, *Essay on Gothic Architecture in Ireland*, 8vo., Dublin, 1828, p. 201-13; ECCLESIOLOGIST *Journal*, 1852, xiii, 172; GRAVES and PRIM, *Architecture, etc., of S. Canice*, 4to., Dublin, 1846-57; KILKENNY ARCHEOLOGICAL SOCIETY, *Transactions*, 1849 to 1854; DEANE, paper on the Mediaeval Antiquities, read at the Royal Institute of British Architects, *Transactions*, 1865-66; and DONALDSON, *Wayside Memoranda*,

1857-8, p. 149. WALLCOTT, *Cathedrals of the United Kingdom*, 12mo., London, 1860, p. 313. R. R. B.

The city also comprises S. Mary's church, probably finished 1328, but completely modernized; another Protestant church dedicated to S. Patrick; a Presbyterian church; a Methodist meeting house; and a Roman cathedral, with five other chapels. There are also a city and county gaol; a court house; an infirmary; a fever hospital; an hospital founded 1581 by Sir R. Shee for thirteen poor people; a union poor-house; a lunatic asylum 1849-51 by G. Papworth, R.H.A., for 150 patients at a total cost of £21,534 for the building; a house of correction; numerous schools, among which is Kilkenny free school or college, designed cir. 1850 by W. D. Butler in the Jacobean style, having a frontage of about 300 ft.; and the college of S. Kyran, a Roman Catholic seminary. The diocesan library, founded 1676 by bishop Otway, adjoins the cathedral, and contains about 4,000 volumes. The Kilkenny model farm was erected 1855 by the commissioners of National Education, at a cost of about £6,000.

KILKENNY STONE. A limestone of an uniform dark bluish grey colour; very tough, though working freely; and capable of bearing a great weight, as is evidenced by the old (cathedral and round tower) and modern buildings of the city, wherein stones of small section exposed to great pressure rarely show any tendency to fracture or splinter. It can be procured in blocks of every requisite size. The lower beds of the quarries produce an inferior quality of marble which is extensively worked into tombstones, etc., and sent to Dublin, Waterford, etc. They are covered by 20 ft. of coarse stone, which is quarried for lime.

Kilkenny has been long celebrated for its black marble. The best beds (which are considered to have been worked out), when newly polished were perfectly black; but the beds are now veined with white; it takes a good polish, and is used for chimneypieces; when exposed to the warmth of the fire for sometime, the shells that are contained in it in considerable numbers become conspicuous, and give it a spotted appearance; WILKINSON, *Geology*, etc., 8vo., London, 1845, p. 208-9. It is fine grained, compact, with crystalline fragments imbedded. Cubes of one inch were crushed with 15,120 lbs.

A slate of second quality, dark blue in colour, of a coarse and open texture, but hard and heavy, is also obtained.

KILLALA. A small town situated at the mouth of the river Moy, in the county of Mayo, in the province of Connaught, in Ireland. In the middle of the fifth century a church was founded at Kill-Aladh (Killala) by S. Muredach, a disciple of S. Patrick, which was subsequently erected into a diocese. In 1623 the see of Achonry was united to it; and both were united in 1833 to the archiepiscopal see of Tuam. The cathedral, dedicated to S. Muredach, used since 1817 as the parish church, is an ancient structure of no pretensions; it was repaired in 1836 at a cost of £1661; a spire was built in 1817. The round tower, situated at the other end of the village, is 84 ft. in height, built of oolitic limestone in rubble work; the doorway faces south-east, and is semicircular-headed, the sill being 15 ft. from the ground, at which height the wall is 3 ft. 6 ins. thick; the attic windows are four in number, and angular-headed. About a mile from Killala is the Franciscan friary of Moyne, founded 1460 by McWilliam Burke. The remains are in fine preservation, and consist of the church (135 ft. long by 20 ft. wide, enlarging to 40 and 50 ft. in places by high and broad arches), having a nave with south aisle and transept, a central tower, and chancel, with a chapel on the south side, and a sacristy. Considerable remains exist of the domestic buildings, and of the cloister; a view of the latter with a plan of the abbey, are given in WILKINSON, *Geology*, etc., 8vo., London, 1845, p. 111-2. MACPHELAN, *Statistical Survey of Mayo*, 8vo., Dublin, 1802, p. 127, 148. R. R. B.

KILLALOE. A town situated in the county of Clare, in the province of Munster, in Ireland. It is built on the

west bank of the river Shannon, over which is an ancient bridge of nineteen arches leading to the suburb of Ballina. It was anciently the seat of the kings of Thomond, or West Munster, and was called Kill-da-Lua, from S. Lua or Molua, who founded a religious establishment here in the commencement of the sixth century. About 639 it was erected into a see by pope John IV, who appointed S. Flannan, son of king Tordelvac, the first bishop. In the twelfth century the ancient diocese of Roscrea was united to it, as also a portion of Iniscatha; and in 1752 it received the addition of Kilkennora. It is more than probable that the stone roofed church, described hereafter, now existing in close proximity to the present cathedral, was erected by king Brian Borumha cir. 1000-14. Donald More O'Brien, king of Thomond, who died 1194, also erected a cathedral, which was probably built on the site of the present one. This building, dedicated to S. Flannan, is cruciform, and consists of a nave, chancel, and transepts, with a central tower; there are no aisles or chapels. The nave is 63 ft. 8 ins. in length, by 29 ft. 10 ins. in width; the chancel 66 ft. 8 ins. in length, by 30 ft. 4 ins. in width; the transepts are each 36 ft. 8 ins. in length, and 23 ft. 5 ins. in width, all clear of the walls. The style of the church is First Pointed; all the windows are lancets; and there is no admixture of any other period, except that in the south wall, and close to the west gable, a good Romanesque doorway is merely built into the face of the wall; it has four orders of jamb shafts and arches, all richly sculptured, the surfaces of the shafts being diapered. The west doorway has banded shafts with carved caps; which also appear in other portions of the structure. The south transept, used as a consistory court, has lancet windows with banded shafts and carved capitals to the jambs internally; as is the case with the arch including the triplet in the chancel. The tower is low, massive, and plain: the arches supporting it spring from large and richly carved corbels. Equally richly carved corbels point out the springing of the groin ribs of the vaulting (which no longer exist) to the chancel. The present floor appears to be 4 ft. higher than the original level. A view of this cathedral is given in WARE, *Antiq.*, fol., Dublin, 1739, i, p. 589, edit. by Harris.

Within the precinct, and at the north side of the cathedral, is an ancient stone roofed church (of S. Molua, called by some the oratory of S. Flannan) ascribed by many authorities to the seventh century; it may be considered the type of the very numerous so-called churches scattered throughout Ireland, of the like size, form, and construction. This building originally consisted of a nave and chancel, of which the former alone remains; it is 29 ft. in length, and 17 ft. in breadth, in the clear of the walls, which are 4 ft. thick; it has a barrel vault

part of which only exists), and is lit by a small opening at each end; access to the room was obtained only from the outside. The pointed arch is therein used constructively, also in Cormac's chapel at CASHEL, and other examples; the object being to avoid the great weight on the apex of the stone roofs, which would arise from the use of the semicircular arch. The window openings are few, and of the primitive type found in the round towers, being semicircular, and angular, headed, with converging sides, and quite plain. The doorway, on the contrary, is of the Romanesque type, having a good arch mold supported by a pair of shafts having carved capitals. It was faithfully restored a few years since, under the late diocesan Dr. Tonson. Illustrations are given in PETRIE, *Inquiry*, etc., 4to., Dublin, 1845, p. 275-6; WILKINSON, *Ancient Architecture*, etc., 8vo., London, 1845, p. 93; who likewise illustrates, p. 30, the important green grey slate quarries.

On Friar's island, close to the town, is a very curious church; the nave is in ruins, but the chancel with its stone roof is perfect. The nave is 21 ft. 9 ins. long, and 12 ft. 7 ins. broad; the chancel is only 10 ft. 6 ins. long, and 6 ft. 4 ins. broad. There is a fine stone cross in the bishop's demesne at Clarisford, which was originally brought from Kilkennora: the palace was built about 1790. The other buildings are of no interest. R.R.B.

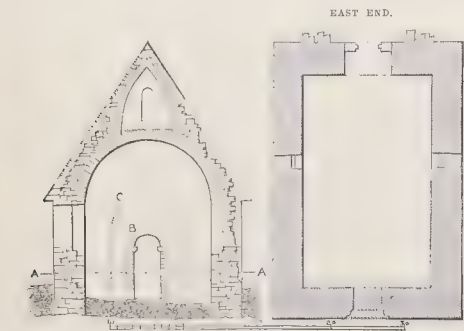
KILLESED or Guttered, see CULLIS.

KILLYN (JAN DE). Upon one of the keystones of the fine vaulting of the interesting early church at Bastogne in Luxembourg, is the inscription "L'an 1536 fût faite cette vouste par Jan de Killyn". On another keystone next to the choir is the date 1535. The vaulting resembles that of the church of S. Croix at Liège; STAPPAERTS, *Belgique Monumentale*, 8vo., Bruxelles, 1844, ii, 105.

KILMABRECK or KIRKMAHRECK QUARRIES. These quarries, situated near Creetoun, in Kirkcudbrightshire, were opened about 1830 for supplying GRANITE for the works at the Liverpool docks. The mode of working at them is described in the *ARCHITECT Journal*, ii, 461; the *CIVIL ENGINEER Journal*, xiii, 335; and the *BUILDER Journal*, viii, 465; from the LIVERPOOL CHRONICLE of October 1850.

KILMACDUAGH. A village situated in the county of Galway, in the province of Connaught, in Ireland. The see was founded 620 by S. Colman, the son of Duach; in 1602 it was united to Clonfert, and both are now united to Killaloe. The cathedral, dedicated to S. Colman, is apparently a very ancient edifice of small size, re-edified in the fourteenth century; it is without any marked feature of interest, and is in ruins. A round tower is stated to lean 17½ ft. out of the perpendicular, which may be an error for 7½ ft. Several stone crosses; a holy well with a circular enclosure; and the ruined church of an Augustinian monastery founded in 1283 by Maurice Ileyan, bishop of the see, also exist. DUTTON, *Survey of County of Galway*, 8vo., Dublin, 1824. R.R.B.

KILMORE. A village situated in the county of Cavan, in the province of Ulster, in Ireland. The bishopric dates not earlier than the end of the eleventh century, and is therefore one of the least ancient in Ireland. It was first called Triburna, from the land on which the cathedral was built being that of Brian king of Connaught (Tir Briuin); this building was a very small cruciform structure, with a central tower. In 1454 the see was removed to Kilmore (the great church), the church of which was raised into a cathedral and the name adopted for the see. In 1742 the see of Ardagh was separated from it and united to Tuam, but they were reunited in 1834 by the Church Temporalities Act, 3 and 4 Will. IV, c. 57. In 1841 the see of Elphin was added to the other two. The new cathedral, dedicated to S. Fedleimid, was designed 1857 by W. Slater, and consecrated in its complete form 17 July 1860; it cost £8,000 exclusive of oak stalls, bishop's throne, etc.; the walling is a dark local stone, with Dungannon stone dressings. It is cruciform, in the Early Decorated or Middle Pointed style, 114 ft. 6 ins. long; the nave is 51 ft. by 23 ft., and 49 ft. across



A. 10. 1 of the drawing shows the west end of the chancel line, showing the opening at the end, and the line of the wall as the church was erected against the existing face of the building at the east end.

of rubble work, over which is an apartment covered with a pointed arch, supporting a stone roof of very high pitch (a small

the aisles; the choir 34 ft. 6 ins. by 23 ft.; the tower 28 ft. square and 100 ft. high, the crossing is 57 ft. high. A plan, with a view of the interior, are given in HOPE, *English Cathedrals*, etc., 8vo., London, 1861, p. 79; the latter reprinted in DUBLIN BUILDER *Journal*, iii, p. 587; exterior and interior views are given in BUILDER *Journal*, 1860, xviii, p. 528-9. The entrance to the vestry is by a rich Romanesque doorway formerly existing in the south side of the old cathedral; it had been removed from the ancient abbey of the Holy Trinity in Lough Erne about a hundred and fifteen years before.

KILMORE SANDSTONE. One of the colonial building stones used at Melbourne, in Australia. It is here named merely for the purpose of recording the table prepared by J. G. Knight of Melbourne, *On Colonial Building Stones*, when arranging for the building of the Houses of Parliament, read by him as president to the Victorian Institute of Architects in 1859, and given in BUILDER *Journal*, xviii, 579. The crushing force of the stone was 3,100 lbs. per square inch; its specific gravity 2.423; and the amount of disintegration 0.650. The same *Journal* (xv, 31) notes that this stone "possesses the singular quality when heated of melting like lead. During the process of fusion it becomes highly elastic. When cooled it presents the appearance of coke on the inside, but on the outside it retains a shining black polish. It is no doubt impregnated with bituminous matter." This material was used for the base of the court house at Kilmore, in Australia.

KILN (Lat. *fornax*, *clibanus*; It. *forno*, *fornace*; Sp. *horno* (brick kiln), *ladrillera*; Fr. *four*, *four de briques*, etc.; Ger. *ofen darre*, (brick kiln, *ziegelofen*), (lime kiln, *kalkofen*). A furnace for burning bricks, cement, lime, pottery, tiles, etc.; also for making malt, drying hops, and many other manufacturing purposes. It generally consists of a furnace below; the heat, flame, and often the smoke from which rises into a sort of chamber through a number of apertures in the floor, and passes off through an opening at the top, which is sometimes fitted with a damper to regulate or shut-off the draughts. Into this chamber or 'body' of the kiln the material to be burnt is stowed before the fires are lighted, as is the case with bricks, pottery, tiles, etc.; a small distance being left between each article to suffer the flame to pass all round. It is provided with a door through which to 'stow' the materials, and to 'draw off' when burnt. Before lighting the kiln, this opening is carefully blocked up with bricks laid in fire clay. The general form of the chamber or body of the kiln is that of a truncated cone, but sometimes it has a domical form of greater or lesser height. When nearly flat roofed, as for burning coal into coke, it is called an oven, and has no opening at the top, but the draught is caused, and the smoke is taken off, by long flues and by chimneys.

Some kilns, as those for burning chalk, lime, and some sorts of cement, have no furnaces below, but coke or coal cinders are mixed with the material to be burnt, and the whole is thrown in at the top. They will all be found described under their various heads; as BRICK KILN (p. 144); and BRICK, MANUFACTURE OF (p. 140); LIME; OAST HOUSE; POTTERY; TILES.

Illustrations of kilns are given in ENCYCLOPÆDIAS, s.v., as by DONALDSON, in the *Encyclopædia Metropolitana*, 1840, s.v. Mortar: and a large, if not a complete, collection, in the ALLGEMEINE BAUZEITUNG, 4to. and fol., Berlin, 1850, pl. 350-57; in BRONGNIART, *Arts Céramiques ou des Poteries*, fol., Paris, 1854, 2nd edit.; VICAT, *Des Mortiers et Ciments*, 4to., Paris, 1848; and DOBSON, *Bricks and Tiles*, 12mo., London, 1850. The kiln used for pipes and stoneware, etc., BUILDER *Journal*, xviii, 241; and BUILDING NEWS *Journal*, 1860, vi, 319: three sorts are shown in ILLUSTRATED BUILDER *Journal*, 1865, p. 189; a smoke consuming brick and pottery kiln in BUILDING NEWS *Journal*, 1857, iii, p. 907; and 'patent kilns' in CIVIL ENGINEER, etc., *Journal*, xii, 81, 188; a glass flattening kiln in the same *Journal*, x, 143. The Roman kilns

and pottery are described in BRITISH ARCHÆOLOGICAL ASSOCIATION, *Journal*, i, 1-9; and iv, 217.

KILN BURNT BRICKS. Those burnt in flare kilns, in contradistinction to those burnt in clumps.

KILUENZA (FLORINO DE), see PITUENZA (F. DE).

KINGAVAR, in Persia, see KONKOBAR.

KING BOLT. An iron rod often used instead of a king post, and quite as serviceable, as it is in fact a tension rod. It should always have an iron head to receive the tops of the principal rafters, and a strong washer with nut under the tie-beam. Fig. 1 shows a section of the head, which occasionally is formed as in the margin, so that the head of the bolt is sunk into it to allow of the ridge piece being secured as usual.

The feet of the struts are sometimes received in a similar casting, the rod passing through it to the underside of the tie-beam.

KING CLOSER. The term given to a portion more than half the length of a brick, used to fill up a space at the angle of a wall: it is also called a 'bat'. A portion less than a half brick is called a 'queen closer'.

KINGGOODY STONE, see DUNDEE STONE.

KING POST (Lat. *columnna*; It. *monaco*; Sp. *punzon*; Fr. *poinçon*, *pointal*; Ger. *giebelsäule*). The term for the upright post in the centre of a truss for a roof (it is called also 'prick-post' and 'crown post' by old English writers) reaching from the ridge to the tie-beam, and sustaining the latter or keeping it from sagging. It is, of course, in a state of tension. The head should be haunched as at A, to receive the heads of the principal rafters; and the foot as at B, for the struts: the tie-beam should be secured with strong iron strap ties, with reversed keys to tighten up in case the tie-beam shrinks; but where it is desired to conceal the strap a bed-bolt may be used with washer and nuts for the same purpose.

TREDGOLD, *Carpentry*, gives scantlings of king posts for roofs of 20 ft. span, as 4 ins. by 3 ins., graduating to 30 ft. span, 6 ins. by 4½ ins.; beyond that dimension the span becomes sufficiently wide to require two posts, which are then called 'queen posts'; and their scantling will depend on the general design. This post was also called a JOGGLE PIECE.

This 'king post roof' as part of a system of framing, is in general use in the Classic and modern styles of architecture, either for open roofs or to support ceilings, plain or caissoned. Examples will be found in every work on CARPENTRY.

The level tie-beam and its king post were used almost invariably during the Romanesque and Norman eras; and also in the Early English period, when the larger churches, etc., were vaulted and the timber roofs were not seen from below. In these instances, as the roofs were very steep and necessitated many purlins, there were of course many struts, and from the resemblance of these to the branches of trees, the king post acquired the name of *tree post*.

In some of the roofs of the Decorated period there were level tie-beams with king posts, from which curved braces sprang each way, lengthwise as well as laterally, not only to the purlins but to the ridge; these also were called *tree posts*. In the Perpendicular period large roofs were often constructed with *hammer-beams*, but also very often with level tie-beams; in which latter case, instead of regular king or queen posts, the truss is filled in with a continued series of Perpendicular tracery. Examples are given in BRANDON, *Open Timbered Roofs*, 4to., London, 1849.

After having been discarded for some years in modern Gothic work, the tie-beam has been lately reintroduced by professional men, probably because the thin walls now necessarily built, are forced out by the pressure of the heavy collar-

beam, braced, or hammer-beam, roofs. French specimens are shewn in VIOLET LE DUC, *Dictionnaire*: in that country they were used throughout the mediæval period, the parts being not framed but pinned or keyed together.

KINGRA. The Hindoo term for a parapet; see GULGAR.

KINGSTOWN QUARRIES, see GRANITE of Ireland, p. 76.

KING'S YELLOW. The name given to ORPIMENT or the yellow sulphuret of arsenic, when used as a pigment. CHINESE YELLOW.

KING TABLE. A string course. In the Ely Sacrist Rolls, 8 Edward III, is recorded "38 ped. de kyngestabl"; and 19 Edward III, "In 60 ped. kyngestables et 40 ped. crestes 67s." These entries are supposed by WILLIS, *Arch. Nomenclature*, 4to., Cambridge, 1844, p. 36, "to belong to the upper works of the stone octagon at Ely cathedral. Beneath the parapet, instead of a corbel table, there is a deep hollow occupied by running leaves, and having small ball flowers at intervals. The form and arrangement so nearly resemble the ornament beneath the seat of the royal throne in the great seals of Henry III and the two first Edwards, that I conjecture that it derived the name of king's table from this imitation." The term, however, may have been used to signify a topmost or crowning string, in the sense of a head or chief, as workmen still say a 'king post' and a 'king closer'.

KING WOOD, called also GUIANA WOOD, VIOLET WOOD, and PURPLE WOOD. It is imported from the Brazils, in trimmed logs from 2 to 7 ins. in diameter, generally hollow in the heart. It is beautifully streaked in violet tints of different intensities; is finer in the grain than *rosewood*; and is principally used for turning and for small cabinet work. Purple wood, or *amaranthus*, is imported in logs from 8 to 12 ins. square, and from 8 to 10 ft. long, or in planks; its colour is dark grey when first cut, but it changes rapidly to a dark purple. The true purple wood is plain. It is chiefly used for ramrods, buhl work, and marquetry. HOLTZAPFEL, *Woods*, 8vo., London, 1843, p. 89, 103.

KINNARD, not KINNAIRD as often written, (WILLIAM), succeeded between 1804 and 1810 — Hele as district surveyor for S. Giles's in the Fields, and S. George's Bloomsbury, and October 1812 laid an information under the Building Act against Sir John Soane for erecting the projection to the front of his house in Lincoln's Inn Fields; EUROPEAN MAGAZINE, lxii, p. 381-7; 494. He published 1813 "design for a triumphal arch at Hyde Park Corner". From 1820 to 1826 he exhibited drawings at the Royal Academy of Arts, London, illustrative of the tour he made in Greece, etc.; and in 1823 "a cottage built in Essex". He edited the fourth or supplemental volume to STUART and REVETT, *Antiq. of Athens*, fol., London, 1830, and supplied *Remarks on the Plan of the West Front of the Propylæa; Description of several Sepulchral Marbles; Disquisition on Grecian Ornament; Plan of the Pnyx; Descriptions of some Antiquities at Delos, and of Grecian Antiquities, in the Vignettes*: he is also said to have re-edited Sir G. WHEELER, *Journey into Greece* (1st edit. 1682), fol., London. He died 12 October 1839, and was succeeded by G. Pownall.

KINNEY WOOD, see CEVEY.

KIOSQUE or KIOSK. The name of a Turkish building adopted as a retreat in the hottest part of the summer. The "kiosque des Miroirs", and the "kiosque Haine-Khânèh", both at Ispahan, are given in FLANDIN, *Voyage—Perse Moderne*, fol., Paris, 1844, pl. 43-4, each being a large roof supported on tall slender pillars in front of a large apartment open in front, with a dais and couches at the back. HUGHES, *Travels*, 4to., London, 1820, i, 460-2, describes and gives a plan of the circular kiosk or pavilion of Ali Pasha at Joannina, having eight deep recesses with a fountain in the middle. In England and France, during the last hundred years, a circular summer house with a tent-like roof, placed where fine views

could be obtained in a large garden, was called by this name. NORMAND, *Paris Moderne*, 4to., Paris, 1837-45, iii, pl. 34, gives a plan and elevation of a *kiosque* at Sevenans (Haut Rhin) by Boltez in 1844; and pl. 60, one by A. de Gisor 1842 used as a lecture room, in the Luxembourg gardens, being an enclosure surrounded by a verandah in a Turkish style. Other examples are given in MONITEUR DES ARCHITECTES, ii, pl. 21; ii, pl. 53-4; and vii, pl. 82-3, all of various styles.

An iron kiosk intended to be built at Kafrellais, for the viceroy of Egypt, was designed by R. Stephenson and manufactured by Messrs. Grissell in 1860. It was 106 ft. 6 ins. square, supported on cast iron pillars to stand in a lake, and contained a bath, divan, and other rooms: a view is given in BUILDER JOURNAL, xviii, 72; and a description in BUILDING NEWS JOURNAL, v, 708. Another iron kiosk 80 ft. long by 40 ft. wide, designed 1866 by O. Jones for Bombay, and manufactured by Messrs. Trollope and Sons, is illustrated in the BUILDER JOURNAL, xxiv, 833, 887.

KIOUM. The name given in Burmah to Buddhist monasteries. They are built of wood; but do not appear to have been described in detail, as noticed by FERGUSON, *Illustrated Handbook*, 8vo., London, 1855, i, 53; who gives a cut of a very magnificent one from an engraving in SYMES, *Embassy to Ava*, 4to., London, 1800, p. 388.

KIRB, see CURB.

KIRBY (JOHN JOSHUA), F.R.S., F.S.A., born 1716 at Pasham in Suffolk, having commenced life as a house painter, first attracted notice by a series of views which he is said to have published of the monumental and other antiquities of Suffolk. His first literary work appears to have been Dr. Brook Taylor's *Method of Perspective made Easy, both in Theory and Practice*, 4to., Ipswich, 1755, 2nd edit. Soon after, through the earl of Butte, he was appointed drawing master to queen Caroline; taught perspective to the prince of Wales (afterwards king George III) and to his consort; and was appointed clerk of the works at Kew palace. He also published Dr. Brook Taylor's *Method of Perspective compared with the examples published as Sirigatti's by I. Ware*, 4to., London (1757); *The Perspective of Architecture deduced from the principles of Dr. Brook Taylor*, fol., London, 1761, printed at the expense of George III; and a *Map of Suffolk*, 1766, originally drawn by his father John, who had published *The Suffolk Traveller*, 8vo., London, 1764. He appears to have designed 1762 S. George's chapel, Old Brentford, Middlesex, enlarged 1828; and was president of the Society of Artists of Great Britain, previously to the formation of the Royal Academy 1768. He died 21 June 1774, aged 58, and was buried in Kew churchyard. FAULKNER, *Antiq. of Brentford*, etc., 8vo., London, 1845, pp. 128, 131, 156.

KIRBY (RICHARD) is supposed to have designed (in a commonplace Italian style) Mounthaut or Hill hall, Essex, near the old manor house, for Sir Thomas Smith, principal secretary to Edward VI, who by his Will, dated Feb. 1576-7 and proved August 1577, left him £20 as "chief architect, to be paid as soon as the new house was tiled and all the carpentry work done".—To John Dighton, "steward of the house and overseer of the works, £10 for encouragement to see the workmen do their duty": S(TEPHEN), *Life of Sir T. Smith*, 8vo., London, 1698, ii, p. 228. In p. 205 and 219, it is suggested that the "platform" or design was made by Smith himself: (in the list of books in his library, given therein, are four copies of VITRUVIUS, the only works on architecture named.) The curious painted window, dated 1569, in the hall, is given as frontispiece in colours, to KNIGHT, *Old England*, fol., London, 1845-6; and a view of the hall in fig. 2108.

KIRK. The term still in use in Scotland for a church.

KIRKIN HEAD, see BARGE COURSE, and JERKIN HEAD.

KIRKMABREEK GRANITE, see KILMABREEK.

KIRKWALL. The capital of Orkney island, at the northern extremity of Scotland. The principal street, which

is nearly a mile in length, is narrow and ill kept, the old houses having gable ends towards it: a new street parallel to it has respectable houses and good shops. The chief building is the cathedral, dedicated to S. Magnus, founded 1138, the choir of which has been used from time immemorial as the parish church: bishop Stewart, 1511, added three pillars and a new east end; and bishop Reid, 1540, added three pillars and a new west end, which were never completed. The building is cruciform, with aisles to the choir and nave, a central tower, western porch, and chapels eastward of the transepts: FORSYTH, *Beauties of Scotland*, 8vo., Edinb., 1805-8, v, 71, gives the dimensions as 236 ft. long from east to west, 56 ft. wide, and 71 ft. high; the transepts 30 ft. long and 33 ft. wide; the steeple 170 ft. high. There are three rose windows, the eastern one being 12 ft. in diameter. The building was refitted 1856 by R. Spence, who designed the screen separating the choir from the nave and transepts (*BUILDER Journal*, xv, 53).

The other buildings of note are, the Free, and the United Presbyterian, churches; an endowed grammar school of ancient foundation; several other schools; the town hall; the gaol; the assembly rooms; and two libraries. The palace of the old earls of Orkney, forming three sides of an oblong square, built in the early part of the seventeenth century, is in a tolerable state of preservation; and adjoining the cathedral are the fine ruins of the bishop's palace, comprising a huge round tower, square within, erected with other portions by bishop Reid 1540. NEALE, *Ecclesiastical Notes—Orkneys*, etc., 12mo., London, 1848, reviewed in *ECCLÉSIOLOGIST Journal*, 1849, ix, p. 295. BILLINGS, *Baronial, etc., Antiquities*, 4to., Edinb., 1848, iii, illustrates the cathedral, palace, and castle, in seven plates. Three bays and an exterior view are given in FERGUSON, *History of Architecture*, 8vo., London, 1867, ii, 84-5. The discovery in the neighbourhood of the foundations of one of the round towers formerly numerous in Orkney, 50 to 60 ft. outside diameter, is noticed in *BUILDER Journal*, 1857, Aug. 15, (advertisement sheet.) 50.

KIRNEL and KIRNELLE. Old ways of writing CRENEL or CRENELLE.

KISTVAEN or CISTVAEN (from kist, a chest). A chamber with closed sides, and covered with horizontal stones. In such chambers, according to the size, one or more interments were made. CELTIC BUILDINGS.

KITCHEN (Gr. μαγειρεῖον; Lat. *coquina*, *culina*; It. *cucina*; Sp. *cocina*; Fr. *cuisine*; Ger. *Küche*). The room in which human food is cooked. Among the sculptures from Nimroud now in the British Museum is a frieze, in one compartment of which is represented the interior of the royal kitchen, as consisting of a circle with thirteen turreted towers at irregular intervals, like a walled town. This circle is divided into four compartments, exactly resembling the Egyptian hieroglyphic determinative of country or district. It is figured in BONOMI, *Nineveh*, etc., 8vo., London, 1852, p. 229.

All that has been found at Pompeii in respect of the kitchen to the best houses, seems to have consisted of the very simple provision of a few fireplaces on the top of a brick dresser covered with tiles in a room near a back entrance, as in those called the houses of Pansa and of Sallust. These fireplaces, like

of ovens found at Pompeii seems to justify the supposition that meat was rarely roasted except in the open air, but was generally baked. The decoration of kitchens is given in MAZOS, *Ruines*, fol., Paris, 1824, ii, pl. 35 and 42, *et seq.*

Among the examples of this room erected during the mediæval period, the form of the kitchen at the monastery of Marmoutier was shaped like a bottle; those at S. Florence, Vendôme, Saumur, Villers, and S. Pierre of Chartres (thirteenth century) were round; those at Pontlevoy, Fontevault, Durham, and Glastonbury, were octagonal; those at S. Ouen at Rouen, S. Gall, and Fountains, were square.

TURNER and PARKER, *Domestic Architecture*, 8vo., London, 1851-9, give the following notices and illustrations of Mediæval kitchens:—

- 13 cent. 28 Henry III, Liberate Rolls, "nigh the king's kitchen at Clarendon is to be made another great and square kitchen, which is to be every way within the walls 40 ft." (i, p. 202). At Ludgershall, two kitchens were to be made; one for the king's use, the other for his household (i, 204); a kitchen of wood to be erected at Clipstone (i, 205); and two kitchens at Windsor (i, 67).
- 14 cent. Baby castle, Durham; 30 ft. by 29 ft., with an arched roof, lighted from the centre besides five windows; it has three fire-places; and a gallery round the interior (plan, ii, 208).
- Bishop's Auckland, Durham.
- Bamburgh castle; the whole height of the building.
1368. Durham; abbot's kitchen, an octagonal detached building 35 ft. square (plan, ii, 120); CARTER, *Ancient Arch.*, fol., London, 1795, pl. 55.
- Chichester, bishop's palace; about 40 ft. square, "of the ancient conventual form."
- 1374-420. Glastonbury abbey (PUGIN, *Examples*, etc., ii); or 1335-41, square, four fire-places, stone roof and lantern (BRITISH ARCHÆOLOGICAL ASSOCIATION *Journal*, xii, 385).
- 15 cent. Warwick castle; three short pillars dividing it into two groined portions (plan, iii, 92, 244).
- Fawsley, Northamptonshire; the two kitchens form one side of the servants' court (iii, 247).
- Berkeley castle, Gloucestershire; triangular shaped with the ends cut off square for two doorways and a recess (plan, iii, 255).
- Stanton Harcourt, Oxfordshire; square and lofty, with timber roof (view, iii, 151; plans, etc., 270).

Among other examples are those at—

- Carisbrook castle; a fine work temp. Edward IV.
- Shene palace, temp. Henry VII (VETUSTA MONUMENTA, ii).
- S. Mary's hall, Coventry; 21 ft. wide, four fireplaces (CARTER, pl. 65; BRITTON, *Pict. Antig. of English Cities*, 4to., Lond., 1830, pl. 35).
- S. David's; 36 ft. long, with a low central pillar from which sprang four groin vaults gradually formed into the throats of as many flues.
- Norwich, bishop's palace; groined with a central pillar (ILLUSTRATED LONDON NEWS, 1847, xi, 65).
- Milton Abbas, Dorsetshire; pulled down in 1737, was on the east side of the court; had a stone vaulted roof springing from a centre pillar; and two large chimneys at each end.
- Burghley, Northamptonshire; 48 ft. by 30 ft., groined and very lofty (ILLUSTRATED LONDON NEWS, 1844, v, 329).
- Haddon hall, Derbyshire (RAYNER, *Account*, etc., fol., Derby, 1836, pl. 35).
- Those at the colleges of Trinity, and of S. John, at Cambridge; and of Christchurch at Oxford, are among the most celebrated (ACKERMAN, *Universities*, etc., 4to., London, 1814-5).
- Monastery of S. Niccolò at Catania; the kitchen, like that at Glastonbury, is 42 ft. wide within the walls (HIRTORFF, *Sicile*, pl. 36-40).

After noticing, on the authority of NECKAM, *De Utensilibus*, that the kitchen of a private house was placed on one side of the court opposite to that occupied by the hall in the twelfth century, VIOLLET LE DUC, *Dict.*, s. v. Cuisine, assumes that the partly calcined circular areas, from 13 to 16 ft. in diameter, which are found attached to the enceinte of Norman castles, are the remains of earthen domes which had an opening at the top and served as kitchens. He then gives illustrations of the following existing examples:—

- 12 cent. Abbaye de Marmoutier near Tours; constructed circular kitchen, with five fireplaces and fifteen flues, a domed roof, and no windows.
- Abbaye de la Ste. Trinité de Vendôme; similar, with six fire-places, as many windows, and thirteen flues.



Fig. 1. HOUSE OF ACTON ON SALLUST.

Fig. 2. HOUSE OF PANSA.

A, Kitchen; B, Dresser or raised hearth for fireplaces; C, Back entrance; D, Passage; E, Furnace; F, Stairs; G, Garden; H and I, Privies; P, Atrium or Peristyle.

modern charcoal stoves, would enable the cook to display his skill in every way but in roasting a large joint; and the number

Abbaye de Fontevrault (Maine et Loire); octagonal (formerly supposed to have been a funeral chapel), with five semi-domes as fire-places, thirteen flues, and a spire roof (plan and section, i, 271; and DALY, *Revue Générale*, xiv, 315).

Abbaye de S. Père (or S. Pierre) at Chartres: circular, with six fire-places and thirteen flues, with a gallery for smoking under its groined roof, carried by six pillars (thirteenth century).

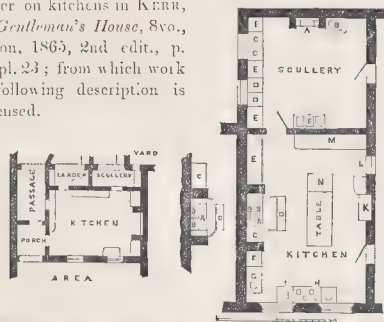
Palais de Justice in Paris; square, with a fire-place in each corner having its hood strutted by a stone spur to one of the nine free pillars which occupy the centre of the room, which he assumes to be the lower story of two floors of kitchens called the cuisines de S. Louis (1226-70), but contemporaneous with Philippe le Bel (1285-1314) next to the tour de l'horloge. He mentions as of the fourteenth century:—

Papal palace at Avignon; the square tower containing an octagonal pyramid with one flue, which was formerly pointed out as the place of the private autos-de-fé. It is now divided by floors, and the stories used as barracks.

Château de Montreuil-Bellay, near Saumur; square, with two fire-places and three flues, with several doors and windows, and a groined roof on four detached pillars (end of the fourteenth century).

Palais des Ducs in Dijon; the square kitchen 60 ft. in diameter, 1450-1500, recently existing in parts, with three double fire-places and seven flues, two ranges of charcoal stoves, and an oven (DIDRON, *Annales Archéologiques*, xi, p. 123).

The accompanying illustration exhibits the arrangements by F. Edwards of Great Marlborough-street, which illustrate the chapter on kitchens in KERR, *The Gentleman's House*, 8vo., London, 1863, 2nd edit., p. 208, pl. 23; from which work the following description is condensed.



The kitchen and scullery in the accompanying plan are arranged as follows:—A, Range; B, Fire; C, Oven; D, Hot water; E, Cold water; F, Sink; G, Dish; H, Dish; I, Dish; J, Dish; K, Dish; L, Dish; M, Dish; N, Dish; O, Dish; P, Dish; Q, Dish; R, Dish; S, Dish; T, Dish; U, Dish; V, Dish; W, Dish; X, Dish; Y, Dish; Z, Dish.

In the scullery are placed:—A, Open range; B, Boilers for meat, soup, and vegetables; C, Two washers for dishes; D, Two slate sinks for vegetables, etc.; E, Three drains, over the one nearest the kitchen may be placed the hot water cistern; F, Steamers for meat, fish, and vegetables.

The other figure exhibits the arrangement of a kitchen adjoining a front area, the open porch being used to intercept the kitchen smell.

This necessity to a house of any pretension first comes into view in English buildings, as the occasional appendage of a noble residence in early times, with its centre fire and roof above open to the sky, its cellar attached, and little else; attaining in the present day the character of a complicated laboratory, surrounded by numerous accessories specially contrived, in respect of disposition, arrangement, and fittings, for the administration of the culinary art in all its details.

In the present day, it demands a position which may be called primary on the plan; having proper relation, i, to the larders and the back entrance for supplies; ii, to the scullery for cleansing; iii, to the dining room, or its sideboard room, for service; iv, to the servants' hall, and steward's room, if any; and v, to the housekeeper's room, and still room, if any.

As it should be well lit everywhere, a ceiling light is to be preferred in large kitchens, with a few windows where necessary. When there is no ceiling light, a single window of large size is preferable to several small ones, unless the room be very spacious. Such light should flank the range rather than be placed in front of it, and be on the cook's left side rather than on the right, when working over the fire. *Coolness* is exceedingly necessary. The aspect of the windows should be northwards or eastwards; any ceiling light should be placed

so as to avoid hot sunshine; the roofing ought not to admit its heat; and if the kitchen be made lofty, the height becomes a means to that end. *Dryness* must not be neglected. *Ventilation* must be carefully contrived, to carry off both smell and steam. The floor ought to be of stone. A central space of wood under and around the table is generally provided; but if the stone be perfectly dry, this arrangement may be dispensed with; otherwise a piece of matting or carpet under the table will suffice; a standing board about 2 ft. wide and ledged, laid loose around a table or in front of a dresser is not unusual, but is likely to trip up persons. A tiled floor in country houses is very common, but it will probably be damp. In small houses, where the kitchen is also the servants' room, a wood floor for the whole is generally preferred: this is often covered with floorcloth to save trouble in cleaning, but when the soil is damp, the timbers are usually destroyed with the rot even when gratings are provided for circulation of air. The walls, or at least the lower portion of them, are best when covered with a hard material to resist damage and to admit of cleaning. The doors are generally these;—one from a corridor well removed from the fire; one into the scullery, which is best close to the fire-place; and usually one leading to the larders. An outer door to the kitchen-yard is probably never advisable. There may be a hatch or lifting window or shutter for the delivery of the dinner when served.

The fittings for a kitchen of a good standard example will be as follows. The fire-place for a *roasting range* with a boiler at the back, and perhaps an oven, from 5 to 7 or 8 ft. wide, and from 27 to 36 ins. deep. A *roasting screen* in front will project about 3 ft. 6 ins. The flue will be 14 ins. square, and for a large range 14 ins. by 18 ins.; this accommodates the *smoke jack*: any minor flues will be 14 ins. by 9 ins., as every fire should have its own flue. The *oven* when detached is placed next the range, occupying about 3½ or 4 ft. by 2½ ft. on plan. *Steaming stones*, two, three, or more in number, will be from 3 to 5 ft. by 2½ ft. on plan, with grates about 10 ins. square for charcoal; they require good light. The *hot plate*, including the *broiling stove*, will adjoin the range or be near at hand, and occupy about 6 ft. by 30 ins. A *hot closet* about 4 ft. by 27 ins. may be placed where it can be conveniently heated by the boiler. A *hot table* about 4 ft. by 2 or 3 ft., for the dishes when serving, may be a useful addition, and is to be heated in a like manner. A pair of *coppers* for vegetables, etc., should be placed in the scullery rather than in the kitchen; they will occupy 4 ft. by 3 ft. on plan; otherwise in ordinary cases, there will be a set of perhaps three steam kettles placed on a dresser occupying about 4 ft. by 2 ft., and heated from the range. A *bain-marie* about 2½ ft. by 2 ft. is a supplementary article for purposes similar to those of the hot plate, and is heated by steam or water from the boiler. A *hot water cistern* may be required to afford a supply to kitchen or scullery; and lastly, a *coal box* should be placed in close connection with all the above fittings. If the proprietor or his cook be fastidious, the architect will do well not to interfere further in the arrangements, than by promoting a timely selection of the contrivances to be used, taking care that there shall be no deficiency of smoke flues and ventilation.

The further fittings will be the ordinary *kitchen dresser*, 10 or 12 ft. long by 24, 30, or 36 ins. wide, having one tier of drawers about 10 ins. deep. It stands against the wall, the space under the drawers being sometimes open, sometimes enclosed with doors; in either case accommodating the cooking vessels, which are placed on a bottom shelf or pot board raised about 6 or 9 ins. from the floor. The *dresser back*, about 7 ft. high, consists of a surface of boarding which supports several tiers of narrow shelves for the ordinary dinner stone-ware, or for the copper articles, the edges being studded with small brass hooks for jugs, etc. In a large kitchen there will be one or more *side dressers*, probably without back or pot board. A *coffee mill*, a *pepper mill*, and a *spice mill* are fixed

in convenient positions as on the standards of the dresser. An ordinary *kitchen table* is from 8 to 10 ft. long, and about 4 ft. wide, or a little more: it has one tier of drawers about 24 ins. wide, and is open beneath. A marble slab or two is sometimes let into the top for certain processes. A *mortar* and a *chopping block* must be placed near the dresser. *Shelving* for other copper articles in any convenient place; and also smaller shelves and pins beside the cooking apparatus at a proper height for depositing forks, spoons, etc., in use. A *spit rack* will occupy a corner. *Pin-rails* for metal dish covers will be near the dresser. *Towel rollers* are required. A *fuel closet* for a considerable supply should be sufficiently near.

The largest kitchens will probably only require an amplification of these details. In some instances, where the operations of mere cooking are more extensive, those of preparing, dishing, and garnishing, are excluded from the apartment, and with them the accommodation for utensils and dishes, and also the common dresser, hot table, and hot closet, except in forms more peculiarly applicable to cooking alone. A *dishing kitchen* is then provided, fitted up with a secondary range, dressers with backs, centre table, hot plates and closets, shelving, drawers, pin-rails, cupboards, service hatch (probably), etc. The dishing being thus disposed of, the preparing is to a large extent accommodated in the scullery and larders, amplified accordingly.

In a small kitchen, a range with a boiler at its side or at back, and an oven, constitutes perhaps the entire cooking apparatus: the *smoke jack* is dispensed with. In the case of a *close range* there will probably be all that is required for *hot closet* and *hot table* in the open space of the fireplace above it. The *roasting screen*; a smaller adjoining *hot plate* if necessary for a somewhat superior case; the usual *dresser* and back; *table*, *shelves*, *pin-rails*, *cupboard*, *coal-box*, *mortar*, *coffee mill* and *towel roller*, will make all complete. In no circumstances ought a kitchen to include the fittings proper to a scullery, as the *sink* and *plate rack*; nor ought there to be any *close closet* serving as a *pantry* or *larder* for cold meat or pastry in the kitchen corner.

The size of the kitchen for a small house may be from 15 to 18 ft. square: it should never be too small. For a mansion it will increase to as much as 18 or 20 ft. by 25 or 30 ft.; present custom, however, leans rather towards a reduction of size and an increase of compactness. It should never be less than 10 ft. high in the smallest house; 20 ft. will not be too much in the largest. Where the kitchen is necessarily made the sitting room for the servants, some regard must be paid to conveniences in closets and drawers; a boarded floor; and a little extra size will probably be required.

The kitchen must be placed in relation to the dining room, so as to facilitate the process of serving dinner hot, and it is in the best class of houses that the difficulties are greatest. The dinner route ought primarily to be as direct, as straight, and as easy as can be contrived, and the transmission of dinner smells be guarded against. There are few, if any, general rules to be relied upon. A *delivery hatch* opening from the kitchen into a corridor or lobby, or service closet, or to the servants' hall, with a dresser within and without, is very convenient, and prevents the servants encumbering the kitchen. The kitchen door is sometimes placed in an external position, communicating with the house by a pent roof or covered way; or a window might be formed in the corridor to open sufficiently near the kitchen door, or two such windows opposite one another. The passage from the kitchen to the main house ought to be wide throughout, and thoroughly ventilated; and no staircase ought to open out of it to convey the odour upwards. Where there is a *basement kitchen*, the difficulties of route are overcome by having a special *dinner stair*, or by adapting the men servants' stair to the purpose, or by using a *lift*; but the transmission of smells may possibly be increased by such means; and the external kitchen door is still worthy

of consideration. With a kitchen so situated, regard must be had to avoid the placing of its windows under those of any room where the smell will be unwelcome,—as also placing the kitchen itself under any room where its heat will be objectionable: the hood over the cooking apparatus is essentially necessary.

In some of the largest houses an *outer kitchen* is provided separate from the cooking kitchen, in which case there is no *still room*, as the outer kitchen serves all its purposes and others of like character, as making of pastry, for example. Here also the lady of the house can come to confer with the cook, or to give directions. The fixtures and furniture will be very nearly the same as those in the *housekeeper's room*, with a dresser and centre table, and perhaps *pin-rails*; the copper vessels being left in the cooking kitchen. The *cook's room* becomes a necessary adjunct of a large kitchen where a man cook is kept.

R. K.

The arrangements of a kitchen, scullery, and pastry room, are described in the *BUILDER Journal*, xviii, 574, 604-5; and for a London house, iv, 367.

Among the recent modern establishments may be noticed the following:—The Reform club house, London; *BUILDER Journal*, 1846, iv, 340; a bird's-eye view of the whole department is given in *ILLUSTRATED LONDON NEWS Journal*, 1842, i, 477; and a plan and specification in WALKER, *Architectural Precedents*, 8vo., London, 1841, No. 7. Windsor castle, the royal kitchen, nearly 50 ft. high, is very long, with a fire-place at each end; same *Journal*, 1850, xvii, 516. Lincoln's Inn library, groined with four pillars; same *Journal*, 1845, vii, 277. Langham hotel, 20 ft. high; *BUILDER Journal*, 1865, xxiii, 433; *BUILDING NEWS Journal*, xii, 422, 726. At Bethlehem hospital (lately built), the kitchen, with its appurtenances, is placed in the centre of the quadrangle, having passages of communication radiating to the three sides of the quadrangle; it works well in all respects. In some instances in the city of London, the kitchen has been placed with desirable results at the top of the house, as at the Rainbow tavern, Fleet-street, where it is 33 ft. by 24 ft. Such also was the situation of this apartment in the old houses at Galway, and said to be similar in that respect to the houses in Badajos and other towns in Spain. A picturesque "Cuisine desservant la maison du Bailly Hameau du petit Trianon à Versailles", by Boisselier, is given in NORMAND, *Paris Moderne*, 4to., Paris, 1819, iii, pl. 150. HERLEBECHERIA; IMARET.

The varieties of English and French kitchen ranges and cooking apparatus in the Exhibition of 1862, are carefully described in *BUILDER Journal*, xx, 705, 726-8: suggestions to guide inquirers as to the capabilities of each invention, in same *Journal*, xix, 770. An apparatus standing in the centre of the kitchen, 10 ft. long, 4 ft. wide, and 3 ft. high, is described xix, 811. The cause of explosions in kitchen boilers during frost, is noted, xix, p. 31; also in a *Report of the Manchester Association*, wherein it is stated that six explosions happened during January (1861?) to boilers in household use.

Soyer's "soup kitchen" is described by himself in his *Charitable Cookery, or the Poor Man's Regenerator*. It is 48 ft. long and 40 ft. wide, with steam boiler, oven, etc., in the centre. It is also described, with a view of one put up in Dublin, in the *ILLUSTRATED LONDON NEWS*, 1847, x, p. 256. A view and description of his "miniature kitchen", fitted up on board the Guadalquivir steam-vessel, same *Journal*, 1847, xi, p. 405: it was 8 ft. wide and 17 ft. long.

KITCHEN GARDEN. That portion of the land belonging to a residence which is appropriated to the cultivation of fruit and vegetables. The royal kitchen gardens at Frogmore near Windsor, "exhibit as fine a specimen of kitchen and fruit gardening, in all the departments of the latter, as is to be found in Europe. We doubt, indeed, whether there is any other garden of the kind which will, in its principal features, bear the least comparison with it. They were begun in 1841, and

are 32 acres in extent." A plan and view, with detailed description, are given in *Pictorial Handbook of London*, 8vo., Lond. (WEALE), 1851, p. 503-6. The walls should be of brick, or where the usual material of the country is stone, it should be lined with brick. Sometimes a heating flue is constructed in the wall, which may then have movable lights arranged against it, so as to prevent injury from unseasonable frosts, and yet not force the fruit so much as to cause it to ripen before the time of the full summer heat, without which it never acquires its full flavour.

KITCHEN YARD. The open area around which are placed the kitchen and other offices attached to a large mansion: it is principally found in country houses.

KITE'S SYSTEM OF VENTILATION. In 1845, James Kite advocated the proper arrangement of reflecting surfaces; this being attained, there is no need for any mechanical arrangements or any necessity for the application of a prime moving power. The construction of his new form of ventilator is well shown in the diagrams given in the *BUILDER Journal*, 1845, iii, 291. It was extensively used, but has been superseded by later inventions.

KJÖBENHAVN. The Danish spelling of COPENHAGEN.

KLAIB BEN THABITA (BEN), see BEN COLAIB (A.).

KLAFTER. An Austrian measure of length, containing 6 Schuh. The Vienna klafter = 2.07424 English yards: that of Hamburg 1.87989 yards: others vary a trifle from the above. ALEXANDER, *Weights*, etc., 8vo., Baltimore, 1850.

KLagenfurt or ZELANZ. A city, once the capital of Carinthia, in Illyria. It is situated on the river Glan, and connected with lake Wöther by a canal: the fortifications erected by the emperor Maximilian at the commencement of the sixteenth century, and destroyed in 1809, now form promenades. It is built in the form of a square, and consists of the town proper and four suburbs, having spacious streets with houses two and three stories in height. The cathedral; the Heiligen-Geist kirche; the town church, having a detached tower about 291 ft. 6 ins. high; the Alumnats kirche; and three other churches: the *landschaftshaus*, finished 1391, having a good hall of assembly; the old castle; the palace of the bishop of Gurk situated in a park; the town house; the lyceum; the gymnasium, and other schools; the general infirmary; and several hospitals, are the chief public buildings. The private palaces of prince Rosenberg and count Goes deserve notice. The cathedral of Gurk, near the town, is a curious Romanesque basilica, with a west tower, a narthex, and a noble west portal: the choir, having eight bays, is raised on a crypt. 28, 50.

KLAUSENBURG (anc. *Claudia* or *Claudiopolis*; Hung. *Kolosear*). The capital of Transylvania, in Austria, situated on the river Little Szamos, consists of the inner town, or town proper, and six suburbs. The former is surrounded by ancient walls, flanked with towers, entered by six gates, and is divided into the old and the new town; the citadel dates 1721. The old town, situated close to the river, and founded by a German colony in 1178 on the site of a Roman town, is of small extent, and has dark and narrow streets. The new town is regularly built, with a central *platz* 1500 ft. long and 1080 ft. broad, from which the streets branch at right angles; the principal one, the *Mitteltasse*, 1800 ft. long and 213 ft. wide, is lined with good houses. In other quarters the houses are chiefly of one story, and never more than of two. The cathedral, dedicated to S. Michael, was erected 1399, and consecrated 1414; it is about 284 ft. long and 102 ft. wide, without a tower, and is somewhat obscured by shops around its base. Trinity church, with two towers each finished with a tin cupola; the adjoining college; the Minorite church, 1795; the Unitarian kirche, 1796; the Greek church, 1798; and four other churches, the new oratory (*bethaus*) dedicated to the evangelists; three monasteries, and a convent; a town house; an academical lyceum, with a library and museums; five other

colleges; an infirmary; a workhouse; three well-endowed hospitals, especially the military one, are the chief public buildings. The town, being the seat of the government of the province, transferred 1790 from Hermannstadt, has therefore several important public offices, with the governor's residence. A casino containing the assembly rooms and a large theatre; and the houses of the nobility, such as those of the counts Bánffy, Bethlen, Csaky, Rhedey, and Teleky, deserve notice. 14, 26, 50.

KLEINER (SALOMON) born 1703 at Augsburg, in Bavaria, was *baumeister* to the elector of Mainz, and professor of architecture at the Imperial academy at Vienna, where he died 1759. He appears to have made drawings for several publications, of views of buildings at Vienna and elsewhere; his architectural works, if any, are not known.

KLENZE (LEO VON) born 29 February, 1784, at Hildesheim, was educated as a lawyer 1798-1800 at Brunswick, and 1800-3 at Berlin, where he also attended the architectural academy, and attracted the attention of Gilly and Hirt. Having laid aside the study of the law, he visited France, England, and Italy, and was appointed 1808 court architect at Cassel, and 1810 director of the royal buildings by Jerome, king of Westphalia. After a short residence at Munich, Vienna, and Paris, subsequent to the fall of Jerome, he was invited 1814 by Lewis, crown prince of Bavaria, to Munich, where he designed the buildings hereafter named (in the order of their commencement, as some of them were many years in hand): 1816-30, the glyptothek, or sculpture gallery (Ionic); 1817, the Leuchtenberg palace (Renaissance); 1820, the royal riding school (Roman Italian); 1822, the bazaar (Venetian Italian); and the hof arcaden; 1823-28, with Probst, the Isar bridge, 286 ft. long, of five arches; 1824-30, the (*kriegs ministerium*) war office (Florentine Italian); 1826-40, the pinacothek, or picture gallery (Italian), the north and south façades 494 ft. in length; 1826, the (*konigsbau*) royal palace (Florentine Italian), the façade 406 ft. long; 1826-37, the (*allerheiligen hofcapelle*) royal chapel (Italian Romanesque), 145 ft. by 103 ft. and 84 ft. high; 1826, the odeon (Renaissance—a copy of the Leuchtenberg palace); 1828-32, the Maximilian palace (Roman Renaissance); 1828-33, the memorial obelisk of bronze, 95 ft. high; 1832-42, the building containing the (*fest-bau*), great hall of the royal palace (Roman Renaissance), with a façade of nearly 900 ft. in length.

Klenze's great work is the Walhalla, or hall of Fame, on the Danube, near to Ratisbon. Although contemplated in 1804 it was only in 1821 that he was instructed to prepare a fresh design; after much modification, the first stone was laid 18 Oct. 1830, and the building was inaugurated 19 Oct. 1842. It consists of a Greek Doric peripteral temple, 98 ft. wide by 232 ft. long measured on the base of the columns, placed on a lofty substructure with flights of steps giving access to the building. CIVIL ENGINEER, etc., *Journal*, iv, 109 with views, 449.

Klenze 1834 visited Athens to determine the site and plan for the new city, and prepared a design for a royal palace. On returning to Munich he began, 1833-35, the (polychrome, monopteral temple (Grecian Ionic); in a letter to the Royal Institute of British Architects, 2 June, 1837, (given in CIVIL ENGINEER, etc., *Journal*, i, 72), Klenze claims this work as being "the first example of lithochromy in the present day." He next designed the north front of the post office (Florentine), the façade being 290 ft. long and 66 ft. high; and 1835 the bronze monument to Maximilian Joseph I, 36 ft. high, comprising a colossal sitting figure executed by Rauch. On the destruction by fire 29 Dec. 1837 of the winter palace at S. Petersburg, he was invited by the emperor of Russia, who commissioned him to erect the new works, an addition to the Hermitage palace, said to be a parallelogram of 520 ft. by 380 ft., with a general height of 74 ft., the angle pavilions being 106 ft.: it was commenced early in 1842 (CIVIL ENGINEER *Journal*, iv, 338), and is said to be built by Kleinmichael. He also

there completed Ricard de Montferrand's cathedral of S. Isaac. Returning to Munich, Klenze designed the Ruhmes-halle or hall of Fame, built 1843-51 (Greek Doric) as a background to the colossal statue of Bavaria; and the archway in the Königsplatz 1846 (Greek Doric) to commemorate the restoration of Greece. Amongst his very earliest works were the monuments of Adolphus of Nassau in the cathedral at Speyer, and of the emperor Rudolph of Hapsburg; the commencement of the restoration of the cathedral at Spire: and his latest employment was the continuation, on the death 1847 of Gaertner, of the Befreiungshalle or hall of liberation on the Michelsberg at Kehlheim, with alterations so extensive as to render it entirely his own work (given in *CIVIL ENGINEER Journal*, x, 34, 163). It was opened 18 Oct. 1863. Many private buildings not noticed in the above list were designed by him and executed under his directions.

His official and artistic distinctions were numerous: he became, 1819 intendant of the royal buildings; 1826 chief building councillor; 1830 chief of the office of works and buildings; 1831 special privy councillor; 1835 royal chamberlain, and superintendent of royal buildings; and was ennobled 1833 with hereditary succession. He was the recipient of nineteen orders, and 1852 of the royal gold medal of the Royal Institute of British Architects, of which society he was one of the earliest (1835) honorary foreign and corresponding members. He died at Marienbad 27 January 1864, having very nearly completed the 80th year of his age.

The publications bearing Klenze's name are, *Versuch einer Wiederherstellung des Toskanischen Tempels*, 4to., München, 1821; *Der Tempel des olympischen Jupiter zu Agrigent*, 4to., Stuttgart und Tübingen, 1821; *Ueber das Hinwegführen plastischer Kunstwerke*, 4to., Munich [1821]; *Die Schönsten überbleibsel Griechischer Ornamente der Glyptik*, etc., 5 pts. fol., Munich, 1823; *Reisen in Italien seit 1822*, with F. von Thiersch, 8vo., Munich, 1826; *Sammlung Architectonischer Entwürfe*, 48 pl., giving the pinacotheca, walhalla, glyptotheca, etc., fol., Munich, 1830-50, 10 parts; *Anweisung zur Architektur des Christlichen Cultus*, fol., Munich, 1833; 1837 with 39 illustrations of his design for churches and monuments, with an infusion of Greek feeling almost overpowering the Italian basis of their design; *Aphoristische Bemerkungen gesammelt auf seiner Reise nach Griechenland*, 8vo. and fol., Berlin, 1838; *Die Decoration der inneren raume des Königsbaues zu München*, 21 pl., fol., Vienna, 1842; *Das Kaiserliche Museum der Schönen Künste in S. Petersburg*, fol., Munich, 1850. A catalogue of his library was printed for its sale, 8vo., Paris, 1864.

Memoir by C. C. NELSON, read at Royal Institute of British Architects, *Transactions*, 14 March 1864; and another in the *Builder Journal*, 1864, xxii, p. 126. RACZYNSKI, *L'Art Moderne en Allemagne*, 4to., Paris, 1836-9, ii, 98, 432.

KLINSKY (JOHANN GOTTFRIED) was born 25 March 1765 at Neustadt near Dresden. Having studied architecture under Krubsacius, he went 1793 to Rome; and on his return 1795 practised at Dresden as well as in other towns of Germany. He published *Versuch über die Harmonie der Gebäude zu den Landschaften*, fol., Pirna, 1799, 5 plates; 2nd edit. 1802; also *Geschmackvolle Darstellung zur Verschönerung der Gärten*, 35 pl., 4to., Leipzig, 1802; 2nd edit. 1807. He contributed 1806 and 1807 to the exhibition of arts at Dresden many drawings, criticisms on which appeared in Tübingen Morgenblatt, 1807, p. 434; and MEUSEL, *Archiv*, ii, 3, 10. According to FÜSSL, he designed the monument to Klopstock; and according to MÜLLER and NAGLER he, with Mehan, designed the monument to Schiller, both at Dresden. In 1816-17 he was *landbaumeister* at Schwäbisch-hall; and was appointed *hofbaumeister* at Stuttgart. The date of his death is not recorded; but NAGLER states that as late as 1827 he was practising as a *baurath* at Ulm. MEUSEL, *Deutsches Künstler Lexikon*, 8vo., Lemgo, 1808-14, i, p. 477. 68. 69. 116.

KLOSTER-NEUBERG (MEISTER WENZLA VON), was

baumeister until the end of the fourteenth century at the still unfinished *hauptthurm* of S. Stephen at Vienna. 92.

KNAP. A very common term in the west of England for rising ground; it is often appended to the names of places, and may have been derived from the Anglo-Saxon word *cnap*. It is probably the Ger. *knopp*, a knob, lump, etc., and the Gaelic *cnap*; the two districts of Argyllshire, North and South Knapdale, may have been so called from their knobby state; NOTES AND QUERIES *Journal*, 2nd series 1860, ix, p. 346, 471.

KNAPPING. The term for the operation of cutting up stones and flints by the knapping hammer. It is the old English word for 'snap', as in the Psalm, xlii, 9, "He breaketh the bow, and knappeth the spear in sunder," as used in the edition of the Bible 1540, and retained in the Book of Common Prayer.

KNEE. Any curved piece of timber. It is sometimes used to stiffen the joint of framing, particularly of raking timbers. Since the greater introduction of iron, wooden knees are now seldom used, except occasionally in Gothic work.

The term is also given to any sudden drop or hollow in a handrail, being the reverse of a RAMP. A. A.

KNEE OF AN ARCHITRAVE, see EAR, and SHOULDER.

KNEELER. The term applied in Gloucestershire to the square return to a label over a late Gothic window. It is also called a 'knee'. In a battlement, a 'kneeler' is a stone that "stands upright, that makes a square outward above, and inward below": HOLME, *Academy of Armory*, etc., fol., Chester, 1688, iii, 472.

KNEE RAFTER. A term defined in some old books as "an angular piece of timber to which other pieces in the roof are fastened", probably the hip and valley rafters. A. A.

It is also defined as "a piece of timber cut crooked with an angle, and then called a knee piece or knee rafter." 4.

KNIFE ROOM. A room usually provided in large houses in which to clean knives, on account of the dust, dirt, and noise. The necessity for such a room has in great measure been superseded by the invention of the knife-cleaning machine, which, however, is not considered to be very satisfactory in its operations. In town houses the knife room is usually placed in a front or back cellar; in one of the out buildings in the rear of a suburban residence; or in the kitchen court of a country mansion. A. A.

KNIGHT (RICHARD PAYNE), an amateur specially learned in Greek art, is said to have designed for his own residence, Downton castle, Herefordshire: NEALE, *Seats*, 2nd ser., iii; and severely criticised in BRITTON, *Toddington*, 4to., London, 1840, p. 21.

KNIGHT (THOMAS), "late mason-in-chief to the city of London, who dyed the 11th of June 1680, aged forty-three years", was buried in Sanderstead churchyard, Surrey: some quaint verses conclude the inscription; BRAYLEY, *Surrey*, 4to., London, 1841, iv, 45.

KNOB (It. *bottone*; Sp. *boton*; *bulto*; Fr. *bouton*; Ger. *knopf*). The protuberance attached to the end or ends of the spindle of a lock by which the catch is turned in order to open the door. The attachment to a lock will be best explained s. v. SPINDLE. A knob is also formed with a screw end to be inserted in the face of a drawer or cupboard door, etc., to form a HANDLE. Knobs are now made in many sorts of fancy woods, metals, and glass, either plain or coloured. A new mode of securing a wood knob to the face of a drawer, is said to be the invention of Dr. L. B. Myers of Elmore, Ohio. Instead of the usual screw, a plane surface is formed having two sharp pins, one on each side, to secure the knob in position when driven into the drawer, and to prevent it from being unscrewed from the outside. A common screw worked from the inside of the drawer into the knob, secures it in its place; BUILDING NEWS *Journal*, xiv, 6. KNOCKER.

The term is also applied to the ornamental termination of the ridge piece to a gable roof. HIP KNOB.

KNOBBLING. The term used near London and in the west of England for the act of reducing a mass of stone in the quarry to a somewhat square block. In the Kentish Rag district this is called 'skiffling'; it is the same operation as 'scappling', a term used in the granite districts: in flint work it is called 'knapping'.

KNOBELSDORF (HANS GEORG WENCESLAUS, Baron von), *baumeister*, born 1697, became a captain in the Prussian army. He left 1730 the military service, and having studied architecture under Kemmeter, von Wangelheim, and Weidemann, became very soon one of the chief architects of his country at that time: painting he learnt under Karl du Bois. He designed the summer palace called Sans-Souci: the king, then prince royal, having given the general outlines: the new wing of the royal castle of Charlottenburg: the castle at Zerbst: and that at Dessau. He laid out the gardens at Potsdam, as well as the thiergarten (zoological gardens) at Berlin. His most conspicuous work was 1731-42 the new opera house in this city; having, previously to making the plans, visited Parma to study the arrangements of the theatre of that town; a description of it is given *s.v.* BERLIN, plans were published by FUNCK, as noticed therein; and in PENTHER, *Lexicon Architectonicum, or Ausführliche*, etc., fol., 1744-75, iv, pl. 81-2: and the roof in KRAFFT, *Charpente*, fol., Paris, 1805, pt. 2, pl. 62: he was much assisted in his works by A. KRUEGER. Knobelsdorf was appointed councillor of the finance committee, and 1740 superintendent of all the royal buildings in Prussia; he died 1758 at Berlin. King Frederic the Great himself edited a biographical notice of him, which was inserted in *Mémoires de l'Académie de Berlin*, viii. 68. 69. 116.

KNOCKER (Gr. *πάπτρον*; Lat. *marculus*; Ital. *martello*; Sp. *llamador*; Fr. *heurtoir*; Ger. *klopfer*). An instrument fixed to an entrance door to announce by knocking, as its name imports, a demand for admission. Rings to doors were very ancient, and are mentioned as early as HOMER, *Odyssey*, i, 441, vii, 90, and as HERODOTUS (*Erato*, 91); that these rings were used as knockers appears from XENOPHON, *Hellen.*, vi, 4; they appear, too, on the door of a temple to Jupiter (SMITH, *Dic. Ant.*, s. v. Janua, in which also a very modern looking knocker, a frowning lion's head holding a ring in its mouth, is given from the Ince Blundell collection at Liverpool). At Pompeii an instrument something like the pestle of a mortar was found suspended to a door by a chain, with a large ring like a quoit for the pestle to strike upon; all being of bronze. In mediæval times the ring by which the latch was lifted served as a knocker, a large nail being driven into the door for the ring to strike on. This explains the common phrase in old writers "he knocked at the ring": the corresponding French terms for the ring and the knob upon which it strikes being *boucle*, and *bouton*, *de heurtoir*. Some of these with the cut escutcheons are very beautiful. In later times several very quaint and picturesque designs have been made for knockers, especially in Italy. *Illustrations*, s. v. Metal Work, pt. 2, 1849-50; pt. 1, 1850-1; pt. 2, 1859; and pt. 2, 1861: also WYATT, *Metal Work*, fol., London, 1852, pl. 6, 7, 31, and 48: and VIOLETT LE DUC, *Diet.*, s. v. Heurtoir. The *BUILDER Journal*, 1854, p. 377, gives three old examples, and also a representation of the ancient 'rasp' or 'tirling pin' used in Scotland to attract attention at a door.

A. A.

KNOEBEL (JOHANN FRIEDRICH) was born 1724 at Dresden. He studied architecture under *oberlandbaumeister* J. C. Knoefel: and practised for long time in Poland; erecting, amongst other structures, one of the wings of the royal castle at Grodno together with the chapel; and also the palace for Count von Brühl at Warsaw. In 1765 he was recalled to Dresden, and appointed *landbaumeister* to the prince elector of Saxony. He died about 1790 or 1792. MEUSEL, *Deutsches Künstler Lexikon*, 8vo., Lemgo, 1808. 68. 69. 116.

KNOEFEL (J . . . C . . .), *oberlandbaumeister* at Dres-

ARCH. PUB. SOC.

den, designed 1744 the gross Buenaische-haus; and assisted in completing 1756-8 the hofkirche; in that city.

KNOEFEL (. . .) with Poepelmann 1732 remodelled the façade of the Japanese palace at Dresden, said to have been finished by Gebhard. In 1762 he designed the Cosel palace, which is also said to have been designed by KARGER.

KNOKE (MEISTER WILHELM) began 1894 the Cyriacus-kirche at Duderstadt, in Hannover. 92.

K\OLL or **KNOWL**. A term used in landscape gardening for a bare rounded hillock.

KNOT. The section, in squared timber, of a portion of a tree which beginning to grow at the pith, becomes in time surrounded by the wood, but still preserves its form and frequently its bark. In some species this branch serves as a bolt to tie together the rings of timber; in others, it is an independent mass. When large and frequent knots occur in timber, they weaken it considerably; hence generally in specifications the timber is required to be free from large or loose knots.

T. L. D.

KNOT or **KNOB** (Fr. *boudine*). The name of the lump in a pane of crown glass, caused by the adherence of the globe to the blow-pipe during the operation of making that common glass. Panes with a central knot were only used for the commonest purposes, and are now perhaps never employed, in consequence of the cheapness of the superior article.

KNOT. The term given by writers of the eighteenth century to a circular ornament in a molding as a cavetto, the centre of it being sunk or cut into a rose; LANGLEY, *Masonry*, fol., London, 1736, pl. 223.

KNOTTYS. An old English word perhaps meaning a crop in the lines, "Yeorven with crockets on corneres, endilong with knottys graven clere" in LAGLAND, *Piers Plowman*, as quoted in DALLAWAY, *Discourses*, 8vo., Lond., 1833, p. 174. The indenture 6 Henry VI (1419), for the construction of the tomb of Ralph Greene at Luffwick in Northamptonshire, notices "un arche d'alabastre amoute tout la dite tombe en longure et largure avec pendants et knottes", where the term probably means the carved work at the end of the drop arches of the canopy: WILLIS, *Arch. Nomenclature*, 4to., Cambridge, 1835, p. 43-5, considers it to mean the bosses of the vaulting. The tomb (without an arch or canopy) is engraved in HALSTEAD, *Genealogies*, fol., London, 1685, p. 189. **KEYSTONE.**

KNOT WORK. The term lately given to a species of ornament of great variety and beauty, met with in manuscripts, on articles of attire, on monuments, and in the architecture, of the middle ages. But, probably, it is on ornamental crosses of the earliest date, British, Anglo-Saxon, Irish, Scotch, Manx, and Norse, that this sort of decoration most largely prevails. Notes on the subject will be found in *BUILDER Journal*, 1858, xvi, 548, 553; FRENCH, *Origin, etc., of the Early Interlaced Ornamentation*, etc., read before the British Archaeological Association 6 August 1858; O'NEILL, *Ancient Crosses of Ireland*, fol., London, 1853-7; WEALE, *Quarterly Papers*, 8vo., London, 1845, noticing the *Primitive Churches in Norway*; and MÖLLER, *Denkmäler*, fol., Darmstadt (1851, pt. iii, edit. by GLADBACH, pl. 42). **INTERLACING ORNAMENTATION.**

KNOTTED SHAFT. A peculiarity in the carving of the shafts of columns in the early part of the mediæval period in Italy, representing a knot; sometimes two shafts are knotted together. STREET, *Brick, etc., Architecture in Italy*, 8vo., London, 1855, p. 233, describing the east side of the *broletto* at Como, writes, "this is not at all an uncommon feature in Italian Pointed, and I have often wondered how it is that the eye is not at once disgusted with it, instead of being, as it usually is, pleased. I take it to be a justifiable desire on some such ground as this: It takes much labour and skill to cut several shafts out of one block of marble, but all this labour and skill is unthought of, if they are entirely separated, or held together by a band which might perchance be made of some other material; this knot therefore is devised as the only means

of explaining to us that the shafts so carved have really been accomplished with a very great expenditure of time and patience and skill, and do not depend upon any artificial band for the firmness with which they are all united in one." Strong as is this expression of opinion, the more general one is that this feature is a very ugly one, and more deserving of reprobation than of employment. Other examples exist in the portals of the duomo at Milan, in the cathedral at Trento, and at San Quirico near Siena (cir. 1288), all shown in GALLY KNIGHT, *Eccles. Arch.*, fol., London, 1842-4; at Ferrara; in the cloisters of S. Giovanni Laterano at Rome; and at Verona.

KNOTTING. In house painting, unless precautions are taken, the turpentine in the knots of deal will often exude and come through and disfigure the paint on joiner's work. As a preventative, the knots are covered over with strong size and red lead previously to being primed. Sometimes strong hot lime mixed to a paste with water is applied, but this has been known to 'kill' the knots, and they drop out. The best method is to well size the knots, and then cover them with silver leaf. PRIMING; PAINTERS' WORK. A. A.

KNUCKLE HINGE (Fr. *fiche à vase*). A name given to hinges projecting considerably from the door jambs, the object being to enable them to fall back without binding against the ground or architrave. HINGE. A. A.

KNUCKLE JOINT. An old name for a RULE JOINT.

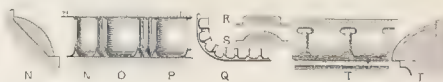
KNUCKLE OF A HINGE (Fr. *naud de fiche*). The semi-circular projecting part of a hinge through which the pin passes. It is so called from its somewhat resembling the joints between the phalanges of the human hand (the joint of the finger at the metacarpal bone rather resembles a ball and socket joint). Each part of the projecting portion of the hinge is termed in French *naud*, whence varieties are designated *fiche à trois nauds*, *à quatre nauds*, etc. BUTT HINGE.

KNULLING. The name given by English workmen to several varieties of an ornament. The term may be a corruption of 'canalling' or 'noyauling', from the Fr. *canal* (sometimes applicable to *j*); or from *noyau* (as applied to *c*); or be connected with the English *knoll* or *knowl*, a little hill; or is perhaps properly 'knuckling'; it has also been written knerling and knurling. This ornament has been more universally employed than any other except the bead-and-reel. It has been used amongst savage tribes, as shown by JONES, *Grammar of Ornament*, fol., London, 1855, pl. 3; in the personal decorations of the Assyrians, preserved in the British Museum; on part of a column and on a fragment from the (so-called) tomb of Agamemnon at Mycenæ (the latter given 1843 by the Royal Institute of British Architects) in the Elgin gallery; and on a Romano-British leaden coffin (where its relation to the bead is self-evident) in the same national collection. The



above illustration is introduced from GODROON, to accompany an addition to part of the explanation of that word: the varieties thus shown are really whole 'knullings' properly drawn on centres perpendicular to two parallel straight lines; these, in order to become godroons, should either be drawn on radiating centres between two parallel arcs, so as to taper inwards, or should be drawn on mitre lines within two parallel lines so as to appear in elevation to taper; the long oval shape being the true Fr. *godron*: thus the pure half-knullings, *n*, *o*, or *p*, seen on the side edges of a table or other furniture become half-godroons where they pass along the rounded corners, as *q*. This employment of the half-knulling and half-godroon in several of its simpler varieties, especially those which have the section *n*, instead of *s*,

marks the furniture designed from about 1825 by the pupils and copyists of the late J. B. Papworth. In his hands an



overhanging knulling (section *r*) became as *t*, which is simply a variation of the border to the lip of many antique vases. The BIRD'S BEAK molding of the Greek architects seems to have represented a combination of the flute below turning over in the upper part to show a knulling.

KOBT, or KOFT, in Egypt, see KUFT.

KOCH (WOLF), *baumeister*, of Ruffec in France, was employed till 1554 on the münster at Freiburg-im-Breisgau. 92. 116.

KOECKER (J. H.), a civil and military architect, designed 1655 the gate called Regulierspoort at Amsterdam, but it was demolished a few years afterwards when the limits of the city were extended. This gate is also attributed to H. van KEYSER. 24.

KOENE or KUYNE (KONRAD), *baumeister*, was employed from 1452 to 1464 or 68 on the dom-kirche at Cologne; the works were stopped 1500-9. At two of the meetings held by the *steinmetz* corporation, or body of masons, 1459 and 1463, at Regensburg and Speier, the title of the *oberbaumeister* for the territory of Northern Germany was granted to him and to his heirs. He died in 1469. MERLO, *Leben und Werke Kölnischer Künstler*. 92. 116.

KOENIG (SIGFRIED or SEIFRID), *baumeister*, of Constance, was employed about 1475-1485 on the yet unfinished tower of the cathedral of S. Stephen at Vienna. 26. 92. 116.

KOENIGHAFEN or KÖNIGSHOFEN (FRIEDRICH), *baumeister*, constructed 1405-6 the Hallen-unter-dem Römer (the lower halls in the townhall) at Frankfurt-am-Main. PASSAVANT, *Kunstreise durch England und Belgien*, 8vo., Frankfurt, 1833, p. 433. 92. 116.

KOENIGSBERG (Latin, *Mons Regius* or *Regiomontum*; Polish, *Królewiec*; Lithuanian, *Kavalanczas*). A town in Eastern Prussia, founded 1255, situated on the river Pregel about four miles above its mouth. It was once the capital of Prussia Proper. The walls and ramparts were built 1626; the detached forts 1843; the citadel 1657; the *Königsthor* 1846; and the *Defensions caserne*, a fortified barrack, 1851. It consists of the town and four suburbs; the former is divided into three parts, the *altstadt*, the *Löbenicht*, and the *knepfah*, situated on an island, access to which is gained by five timber bridges; it contains the oldest houses, which are built on piles, the cathedral, and the exchange. The houses generally are huddled together in narrow and crooked streets. The *parade platz* has the *new* university on one side and the theatre on the other; in the middle is a bronze gilt equestrian statue of King Frederick William III, the work of Kiss in 1851. A cast iron statue of Kant is placed in front of the house in which he lived.

The cathedral, dedicated to the Virgin and S. Adalbert, founded 9-13 September 1333 by bishop John I, was nearly finished 1344, but not completed until 1359. In 1519 the church was in a very dilapidated condition, when Albrecht (first duke of Prussia 1525-68) became *hochmeister* of the Teutonic order; 1544 the tower was burnt, and 1553 rebuilt; 1589 the great stone pulpit erected; 1591-2 the choir and nave vaulted (*erholt*); and 1695 the whole was renovated. The *baumeisters* who were in the service of duke Albrecht were—1531, F. Nussdorfer; 1547, A. Hesse, who rebuilt the upper part of the tower; 1548, F. von der Grun; and 1555, C. Römer. The nave and its aisles under one roof, are 93 ft. wide; the former is 37 ft. wide at the east, 38 ft. at the west, end, and 54 ft. high: the north aisle is 19 and 18 ft. wide at the respective

ends; the south aisle 17 ft. 6 ins. wide; and both 49 ft. high. The choir is 114 ft. long, 48 ft. 3 ins. high, 32 ft. wide at the east, and 35 ft. wide at the west, ends. The piers are 7 ft. 6 ins. long, 6 ft. deep, and 24 ft. high, having a wide plain margin in the centre of each face and well molded on the angles. The towers are 18 ft. 6 ins. by 17 ft. 6 ins. inside, the walls being 8 ft. 9 ins. thick: the height to the cornice of the gable of the north or unfinished tower is 83 ft.; to the apex of the gable in the west front 100 ft.; to the commencement of the dodecagonal termination of the south tower 79 ft.; to the cornice of the spire 120 ft.; to its apex 184 ft. (These dimensions, as given in the following work, are presumed to be in Prussian feet, one foot equals 1·029 English.) GESSER and HAGEN, *Der Dom zu Königsberg*, 8vo. and folio, Berlin, 1833-5, pp. 65, 78, 83; 360; 366; give eight plates of plans, elevations, and views, and of the fine marble monument to Albrecht, with other tombs. The cloister, "stoa Cantiana," dedicated to the philosopher Kant, on the north side of the choir, was erected at the end of the sixteenth century, and cost 1000 marks.

Amongst the other buildings may be noticed the fine Haburger kirche; the Altstadt kirche, built 1839-43 by Schinkel, so full of pillars that the preacher cannot be seen; the *schloss* or palace, founded 1257, a large ugly building now used as the government house, and formerly the residence of the grand masters of the Teutonic order, and of the dukes of Prussia, by whom the east front was built 1532, the west 1594, the south 1551; the *schloss kirche* occupies one wing, and above it is the Moskowiter saal, 265 or 274 ft. long, 60 or 59 ft. wide, without pillars, and only 19 ft. high, destitute of ornament; the inner court was once a tilt yard, and the cellars were dungeons and places of torture; a tower is 240 ft. high, or 278 ft. above the river: the old university founded 1514 and called the Albertine, containing a library of 50,000 volumes and several collections; the stadt museum; a library of 160,000 volumes; the observatory in an old bastion; a botanic garden founded 1809; a gymnasium; an ecclesiastical seminary, and many other schools; a *landhaus*, given in the ALLGEMEINE BAUZEITUNG, 1843, pl. 516; and a *turnhaus*, 1846, pl. 71, p. 308; a handsome exchange; a large post office, 1849; a lunatic asylum; an infirmary; and several hospitals. There are vast ranges of granaries and other warehouses. 28.

KOENIGSBERG (WULFRAM VON), of Franconia, was busily engaged 1425 on the *dom* at Wuertzburg. 92.

KOHRASAR or KOH-HISAR. The ruins of an ancient city in Asiatic Turkey, situated forty-five miles south-east of Diarbekir. The walls were built of squared blocks of basalt, flanked by square and round towers, enclosing a nearly square space of about 700 yards on each side. Excepting a large mound on the east side, the whole space is filled up with ruins of houses, which had been built of hewn stone with semicircular arches. Outside the walls is a cemetery; each tomb is built of massive stones forming a separate chamber, one in front and one on each side. The origin of the city is unknown, but the more lofty ruins apparently of churches, and the crosses on the tombs, show that it was occupied by Christians. 50.

KOL (KONZ) was engaged 1499 upon the *dom* at Wuertzburg. 92.

KOLDENBACH (WERNER VON), born at Cologne, was a *steinmetz* who went about 1280 to Oppenheim, and directed as *meister* the construction of the church of S. Catherine. MERLO, *Leben und Werke Kölnischer Künstler*. 116.

KOLMAR, in France, see COLMAR.

KOLOSVAR, in Transylvania, see KLAUSENBURG.

KONIA, KONIEH, and KONIYEH, or KUNJAH (the ancient Iconium). A city in Asia Minor or Asiatic Turkey, situated in the centre of a great and partly marshy plain. It is now in a state of great decay; and has suburbs to the south and east not less populous than the city itself. The walls, from two to three miles in circuit and 30 ft. high, are of Saracenic workmanship, built of large well cut blocks of stone, and having

square towers with rich cornices, carvings, and inscriptions. The Turkish bazaars are the only inhabited portion of the central city, and appear to be of the same date as the carvings over the city gates. The most remarkable building is the Injemi Minareh Djami, "the mosque with the minaret reaching to the stars", having exquisite delicate tracery, fretwork and moldings. The old Turkish prison resembles a Gothic castle, with its ruined towers, battlements, and keep; several handsome mosques, and sepulchral chapels, objects of veneration, are crumbling into ruins, as are also upwards of twenty medressehs or colleges and as many mosques with or without minarets; the latter like many in Persia are chiefly built with glazed tiles and bricks of various colours, red and blue predominating. Outside the town to the north-west is the cemetery. HAMILTON, *Asia Minor*, 8vo., London, 1842, ii, p. 196, 205-8. 50.

TEXIER, *Asie Mineure*, fol., Paris, 1839-49, ii, pl. 97, gives a view of the gate of a bazaar; pl. 98, a plan, elevation, and section of the 'Medressé Bleu;' pl. 99, decorations of the gate formed of tiles with a blue pattern; pl. 100, a view of the ruins of the palace of the Seljoukide sultans; pl. 101, the pendentive cornice in the palace, and pl. 102, a ceiling, both in gold and colours; pl. 103, a bas-relief of a Lycæonian soldier (in colours); pl. 104, the façade (in outline) of the mosque of the sultan Ala-eddin, Energheli Djami-si; and pl. 105, the gate (in outline) of a medresseh of the Seljoukides.

KONKOBAR, also written Concovar, Kangovar, Kengavar, Kengaver, Kengover, Kingavar, and Kungavar. A town situated about forty miles south-west of Ecbatana or Hamadan in Persia. It is noticed here on account of the antique remains in the neighbourhood, which are supposed to be those of the Doric temple to Diana, mentioned by Isidorus of Charax.

"To the west, the bases of ten, and a portion of the shafts of eight, pillars remain standing; these are from 6 to 7 ft. high. The pillars measure from 4 ft. 8 ins. to 4 ft. 9 ins. in diameter, and 14 ft. 11 ins. in circumference. The basement is formed of large blocks from 6 to 9 ft. in length. The whole building is of greyish white veined marble. Huge fragments of pillars lay scattered about, and the stones seem marked as if to prevent their being displaced"; KEPPPEL, *Personal—India*, 8vo., London, 1827, ii, 88. FLANDIN, *Voyage en Perse*, fol., Paris, 1844, gives, pl. 20, a plan of the city, and of the enceinte, 751 ft. 4 ins. from east to west, and 715 ft. from north to south, in which direction the temple is placed. Four plates give a view, a plan and elevation, and details, with a parallel of the temple with that at Palmyra. The sixteen columns are shown as 4 ft. 9 ins. in diameter, and about 15 ft. 6 ins. from centre to centre.

KONRAD (. . .) of Cleves, in Germany, directed 1375-8 as *meister* the construction of the roof and vaulting to the southern tower of the church of S. Victor at Xanten. EGGERS, *Deutsches Kunstblatt*, 4to., Leipzig, 1850-2, iii, 426. 116.

KOODIL. The term in Hindostan for a tank with steps all round it; an example of one is given by FERGUSSON, *Picturesque Illustrations*, fol., London, 1847, pl. 50. A well with one or more flights of steps is called a BOWREE, as pl. 17; a well without these steps is called a KOVAH.

KOORNEH or GOORNEH, in Egypt, see THEBES.

KOPP (. . .) *baumeister*, constructed the Pesthofskirche and the Spinnhauskirche, both at Hamburg. A JOST KOPP, *baumeister* at Münster, died in 1830. 69.

KORNHAUSEL (JOSEPH), was a member of the Academy of Fine Arts at Vienna, where he designed 1823 Weilburg, the summer residence of archduke Charles, having a front of 660 ft. in extent; 1838 the Leopoldstadt theatre; and Diutmann's house in the Prater, a Corinthian hexastyle on a rustic basement, with a pediment over the entire width of the façade. The date of his death is not found. 14. 26.

KORSABAD, in Western Koordistan, see KHORSABAD.

KOSILOV or KOSLOW (. . .), commenced 1785 for Ca-

therine II, the Imperial summer palace called the Pella, situated five miles and a half from S. Petersburg. It was abandoned by Paul I whilst yet unfinished; and continued under Alexander I, but never completed; only three pavilions now remain; ERSCH and GRÜBER, *Allgemeine Encyclopädie*, 4to., Leipzig, 1841. 69.

KOSITZE, in Hungary, see KASCHAU.

KOSTHAKAR. The name of one class of the Buddhist temples in Nepal. It consists of a square base, containing a cell intended for a statue like those of Brambanam in Java, and crowned by a copy apparently of a tope with its terminal. An example is given fig. 1029 in FERGUSON, *Hist. of Architecture*, 8vo., London, 1867, ii, 543, as explaining a form in Hindu architecture, afterwards common. ROYAL ASIATIC SOCIETY, *Transactions*, ii, p. 5, and ASIATIC SOCIETY OF BENGAL, *Transactions*, 4to., Calcutta, 1828, xvi, p. 442.

KOTAR. The ancient name of ZARA, in Istria.

KOTLIK or KOTTIK (ANDREAS), superintended 1380 as *baumeister* the construction of the metropolitan church of S. Veit at Prague. A memorial of him was erected in one of the galleries of that church. 20. 116.

KOURZ (PAUL), a Franciscan, designed the choir of the church of the grande chartreuse at Liège, the foundations having been laid by the prior dom Gilles de Liverlo. He died 12 December 1733. VILLENFAGNE, *Recherches*, 8vo., Liège, 1817, ii, 369; and *Mélanges de Littér.*, 1788, p. 146.

KOUTAIS, in Asia Minor, see KUTAIS.

KOUYUNJIK TEPE, called locally Kalah Ninawe. The name given to a mound of ruins situated in the pashalic of Mosul, in European Turkey. The site which is accepted as one of the points defining the extent of NINEVEH, is about two miles north-east from Mosul, eight miles south from Khor-sabad, and twelve miles west from Karamles, the distance, about sixteen miles, between the two last named places, is the length of the base of a triangle having a right angle at Kouyunjik. Directly south-east of the site, and separated from it by a small river called the Khauser, is another mound, about 50 ft. high, extending 430 ft. from east to west, and 353 ft. from north to south, on which is the village of Niniohah, with a mosque, formerly a Christian church dedicated to Nebbi Yunis (the prophet Jonah), where his traditional tomb is so much revered by the Mahometans as to render permission to excavate the chambers that were indicated by RICH extremely impracticable; in an edifice on this mound has been found the name of Esarhaddon (B.C. 683 or 680) who built a palace for his son at Shereefkhan near Kouyunjik. The mound on which the village of Kouyunjik itself stands, is 178 ft. in its greatest height, 1,850 ft. in the length of its summit from east to west, and 1,147 ft. in breadth from north to south, according to BONOMI, *Nineveh and its Palaces*, 8vo., London, 1857, p. 3, who, p. 105, states the height to be 43 ft. and the circumference of the mound to be 7,600 ft., and p. 499 states that Rawlinson has identified Sennacherib as the builder of the city, B.C. 703, whose grandson Sardanapalus II (died B.C. 667) made additions; the name of Nabbonad the father of Belshazzar has also been obtained in the ruins. The two mounds are enclosed by the remains of a wall constructed with unburnt brick; RICH notices that on the southern face of this enclosure were found large stones laid in layers of bitumen and lime mortar; also some very thick layers of red clay as hard as burnt brick, but without any indication of reeds or straw having been used; sandstone cut into blocks; and large slabs of inscription with bitumen adhering to the under side. RICH, *Memoir on the Ruins of Babylon*, 8vo., London, 1815; and *Residence in Koordistan*, 8vo., London, 1836, i, 136.

On the west side and near the southern extremity of the hill of Kouyunjik, Botta commenced his excavations which were carried on from December 1842 to the end of March 1843, without obtaining anything sufficiently perfect to reward the trouble. But a rich collection of sculptures of figures and of

the symbolic tree were found in the trenches opened 1846 on the southern face of the great mound at Kouyunjik by Layard, who during his excavations 1849-50 in that part of the palace which had not been destroyed by fire, discovered a large room filled with terra-cotta tablets piled in large heaps from the floor to the ceiling; having obtained here also the materials for a large series of illustrations of the rule, conquests, domestic life, and arts, of the ancient Assyrians, and ended his researches at Kouyunjik and at Nebbi Yunis in 1851. OPPERT's discoveries are related in *BUILDING NEWS Journal*, 1859, v, 79, 103.

KOZAKOV (. . .) commenced rebuilding 1787 the summer palace Tzarskoesele for the empress Catherine of Russia, after the greater portion designed by BAZHENOV had been destroyed.

KRAHE (HEINRICH VON), *baudirektor* to the duke of Brunswick, practised in the beginning of the present century, at which period he built the theatre and many houses at Coblenz, together with several constructions in Brunswick. NAGLER states that he was living at an advanced age about 1820. 68.

KRAFFT (NICOLAUS), *baumeister* of Stettin, constructed 1411 the tower of the *Mühl-thor* at Brandenburg. 92. 116.

KRAFFT (ADAM), *baumeister*, was born about 1435 at Nuremberg. His works in sculpture are scattered over Germany, and principally in his native town; his chief performance being the remarkable stone TABERNACLE (*sacramenthäuschen*) fixed against one of the pillars of the choir of S. Lorenz-kirche in that city; it was executed 1500 for a citizen, Hans Imhoff, for 770 florins or about £70 sterling. The portraits of himself and of his two assistants as kneeling figures are introduced. A view is given in DOPPELMAYR, *Nürnbergische Mathematicis und Künstler*, fol., Nuremberg, 1730, pl. 2, p. 178. He is supposed to have died 1507 when past work, in the hospital at Schwabach near Nuremberg, and to have been buried in the cemetery of S. John in that city. HAGEN, *Norica, oder Nürnbergische Novellen aus alter Zeit*, 8vo., Breslau, 1829, translated, *Norica*, etc., 16mo., London, 1851, pp. 170-81, 269-79, contains some interesting information about his works, and therein it is stated that he designed and erected a mosque at Tunis about 1465; MOLLER, *Memorials*, etc., translated by LEEDS, 8vo., Lond., 1836, p. 119. 14. 68. 69.

KRAFFT (JEAN CHARLES), *architecte-dessinateur*, was born 19 June 1764 at Brunnerfeld in Germany. He became a naturalised Frenchman and practised at Paris. The following list contains his principal publications, which are of a very useful practical character and well illustrated; *Plans, etc., de divers productions de l'art de la Charpente, exécutées tant en France que dans les pays étrangers*, fol., Paris, 1805, with 220 plates; together with RANSONNETTE, *Plans, etc., des plus belles maisons et hôtels construits à Paris et dans les environs*, fol., Paris, 1801-2; *Plans des plus beaux Jardins de la France, de l'Angleterre, et de l'Allemagne, et des édifices, monuments, fabriques qui concourent à leur embellissement*, etc., fol., Paris, 1809-10, 2 vols., with 96 plates; *Portes cochères et portes d'entrée de Paris*, 4to., Paris, 1809, with 50 plates; *Recueil des plus jolies Maisons de Paris et de ses Environs*, 4to., Paris, 1809 [this was continued by THIOLLET]; together with DEBOIS, *Productions des plusieurs artistes français et étrangers relatives aux Jardins pittoresques et aux Fabriques de differens genres qui peuvent entrer dans leurs compositions*, 4to., Paris, 1810; *Recueil des plus beaux Monuments anciens et modernes*, Paris, 1812; of this work, one part with 30 plates only was published; and *Traité sur l'art de la Charpente, théorique et pratique*, fol., Paris, 1819-22, with 180 plates. Krafft died at Paris in Dec. 1833, "aged 65 years" according to the journals of the period, but aged 69 if the date of his birth be correct. 68. 112.

In pl. 6 of his work on *Carpenry*, he gives a roof à la Mansard, designed by himself, at Massaw, in Alsace.

KRAMSITZER (. . .) designed 1780 the royal villa called Lazienki, at Warsaw. 14

KRAUS (JOHANN JACOB), *baumeister*, was born about 1611. He studied architecture under Elias Holl, and designed the new Heiligen Kreuzkirche at Augsburg, which was destroyed in the Thirty-years' war. He first made a drawing of the old church, which was engraved by his nephew T. U. Kraus on two sheets. He died in 1672; and was succeeded as *baumeister* by his son, called likewise JOHANN JACOB, born 1642, who died in 1701: LIPOWSKY, *Bayrisches Künstler Lexikon*, 8vo., Munich, 1810, i, 163; VAN STETTEN, *Briefe*. 68. 69. 116.

KREGLINGER (WILHELM), of Wuertzburg, is noticed as one of the last *werkmeisters* engaged on the S. Georgskirche at Noerdlingen in Bavaria; he succeeded Eseller, and conducted the works 1464-1480: a KUGLER seems to have succeeded him. 68. 92.

KREMLIN. A name common in Russia for any fortified enclosure surrounding a church, such as that most celebrated one at Moscow.

KREMnitz and CREMNITZ, also called Körmöcz-Bánya. A city in the province of Bars, in Hungary. The inner town contains only forty houses beside the castle; but its suburbs are extensive. The chief buildings are the former cathedral, built 1461, having a coppered roof with two lofty and richly gilt steeples; four other churches; the archiepiscopal residence; the chancery; the mint; the town-hall; the gymnasium, or royal college; a convent; three schools; and two hospitals. 14. 26.

KREMS (CREMS), KREMnitz, or VIENNA WHITE. (Fr. *blanc d'argent*.) A white carbonate of lead, deriving its first name from a place in Austria, and the second from a place in Hungary; it is also called Vienna white, being brought from that city in cakes of a cubical form. Though highly reputed it has no superiority over the best English white leads, and varies like them according to the degrees of care or success with which it has been prepared. Flake white is often superior to it. FIELD, *Painters' Art*, 12mo., Lond., 1858, p. 19. HYDROFUGE.

KRIEB OF GLASS, see GLAZIER.

KRINNER (M....), was *baumeister* at Linz, in Austria, where he built 1732 the church of the Ursulines, of which the towers were not completed until 1772. 26.

KRISTIAN (ALEXANDER), see CHRISTIAN (A).

KROMLECH, properly CROMLECH.

KRUBSACIUS (FRIEDRICH AUGUST) was born at Dresden, and studied as *baumeister* under his uncle lieutenant Krubsacius, the *land baumeister* Longuline, and general von Bode. Among his theoretical works are *Wahrscheinlicher Entwurf von des jüngeren Plinius Landhaus und Garten in der Toskanischen Gegend gelegen*, 8vo., Leipzig, 1762; and *Wahrscheinlicher Entwurf von des jüngeren Plinius Landhaus, Laurentinum genannt*, 8vo., Leipzig, 1766. Amongst the numerous buildings designed by him are, the castle of Otterwisch, with its gardens; the summer palace and gardens for Prince Anton of Saxony; the palace for Baron von Riesch at Neschwitz in the Upper-Lausitz, with its conservatory 175 ells in length; at Dresden, the palace and garden of the late dowager Electress; the palace for prince Xavier near the Pirna gate; the rear façade of the Riesch, afterwards the Schall, palace; and 1774 the *steuer (assise) haus, landhaus*, or chamber of the States, 120 ft. by 200 ft., one of the most splendid buildings in Saxony. He also designed numerous buildings in Poland and Mecklenburg, with the palace Busch at Hanover. In 1776 he was appointed *ober-hof-baumeister*; he was professor in the Academy of Arts at Dresden; and also a member of the Economical Society at Leipzig. He died in 1790. MEYER, *Grosse Convers. Lex.*, 8vo., Hildburghausen, 1851, xix: LEHNINGER, *Descr. de Dresde*, 8vo., Dresde, 1782. G. A. Hoelzer and J. G. Klinsky were instructed by him. 68. 69. 116.

KRUEGER (ANDREAS), was born about 1719 at Neuendorf, near Potsdam, and studied architecture under *bau-inspektor* ARCH. PUB. SOC.

Feldmann at Berlin. In 1737, when eighteen years of age, he was appointed *baucondukteur*, and assisted in that capacity baron von Knobelsdorf in his most important works, especially the opera house. He was professor of architectural drawing at the realschule; and died in 1759. 68. 69.

KRUMMAUER (HANS DER) was *werkmeister* 1405 on the cathedral at Passau in Bavaria. 92.

KRYGER (WILLEM), of Rotterdam, flourished in the beginning of the seventeenth century. HEUVEL. 24.

KUBBEH and TURBEH. Terms used in Hindostan for a Tomb.

KUBICKI (....) added 1816 a new façade to the *zamek*, or ancient royal palace; 1818 designed the riding house consisting of a hexastyle Doric portico to the two façades; the artillery barracks; and the cavalry barracks, all at Warsaw. 14.

KUEHLMANN'S PROCESS FOR PRESERVING STONE. A process published 1841 by F. Kühlmann, professor of chemistry at Lille. A paper *On the Formation of Hydraulic Limestones, Cements, and other Minerals, in the moist way*, is given in the *CIVIL ENGINEER Journal*, 1849, xii, 286, from the *Annales de Chimie*; and *BUILDING News Journal*, 1857, iii, 1264-5: in the *SOCIETY OF ARTS Journal*, 1855, given in the *BUILDER Journal*, xiii, 380: and on *Hydraulic Cements*, in the latter *Journal*, 1858, xvi, 402. A Report on "Water Glass or Oil of Flint", by a French government commission, was translated 1859 and printed for private circulation at the instance of the late prince Consort, as president of the Society of Arts: condensed passages are given in the *BUILDER Journal*, xvii, 411-2. Silicate of potash dissolved in twice its weight of water, is diluted with twice its volume of water. In new buildings this solution may be applied at once; older ones require to be cleansed by washing with a hard brush; or by a solution of caustic potash; and most frequently, by smart scraping. Large surfaces are sprinkled with the solution by pumps or large syringes with divided jets; care being taken to collect the excess of liquid by glazed earthenware gutters placed at the foot of the walls. For sculptures and certain portions of buildings, soft brushes are employed; and painting brushes with great advantage. Experience has shown that three applications, on three consecutive days, suffice to harden stone. The quantity absorbed varies with the nature of the stone and its porosity. The cost of the silicate does not exceed 7½d. per square metre for the most porous stones.

The process in 1859 had been applied at Lille, to the new sculptures at the exchange; to the works of restoration in the church of S. Maurice; to a new church at Wazemmes; to the hospital of Seclin; to some works of the corps du génie; and to several private buildings; where it was found to answer perfectly. Since 1841 MM. Benvignat, Marteau, and Vorly, have tested the efficacy of the process. It has likewise been employed at Versailles, at Fontainebleau, at Chartres cathedral, at the town of Lyon, at the Louvre, and at the cathedral of Notre Dame in Paris. MM. Lassus, Lefuel, Viollet-le-Duc, and other architects, have obtained most satisfactory results. Kühlmann also advocated the dyeing of stones, silicious painting, a new white colour by the use of artificial sulphate of baryta, new mineral colours, silicious painting upon wood and upon glass, etc. To the translated report is appended the translation of his pamphlet, *Practical Instructions on the use of Soluble Alkaline Silicates (Water Glass) in Painting, and for Hardening Stones*, 8vo., London, 1859. The process is favourably regarded on the continent in consequence of its not changing the character and external appearance of the stone. In England, it has scarcely had any advocates; it was tried in 1857 and 1858 on the rapidly decaying stone at Westminster abbey; the report in 1861 stated that "the effects still remain; the stone is a good deal hardened; the decay, in parts, arrested, but by no means perfectly"; INST. OF BRIT. ARCHITECTS, *Transactions*, 1860-61, p. 146; wherein (p. 179) Dr. Hofmann stated that "if the theoretical reasoning

could be relied upon, he had no hesitation in stating his belief that the chances were in favour of the original process proposed by Fuchs and Kühlmann."

In this process the carbonates of lime are washed with a solution of an alkaline silicate, as silicate of soda or potassa, or "water glass" as Kühlmann called it, with a view to convert them into silicates of lime through the elective affinities of the lime and the silica. In some cases the system has succeeded, and very great hardness, very great resisting powers, have been communicated to the stones operated upon. But unfortunately, the action of the silicic acid is a very slow one, and when the surfaces worked in the manner described are exposed to rain, it is by no means rare to find the solution washed away. Another objection is, that when the alkaline silicate acts upon the stone, the soda or potassa is left free, and in efflorescing is likely to carry away the finer details of the sculpture; at the same time that it forms to some extent a deliquescent salt upon the face of the stone, it attracts a dangerous amount of humidity. This process is only applicable to the preservation of stones in which the carbonates of lime predominate.

G. R. B.

In 1855 Kühlmann proposed to employ the same agents for indurating chalk, as detailed in *BUILDING NEWS Journal*, i, 1198; for finishing and painting, same *Journal*, 1857, iii, 330: his new *Baryta paint* is noticed in iv, 976, 1002, 1223. PRESERVATION OF STONE; SILICATISATION.

KUEHNEL, sometimes improperly written KHÜNEL (PAUL VON), of Oldenburg, designed 1821 the dom kirche at Gran in Hungary; the first stone was laid in 1822, but dying in 1824 the building was left unfinished. The works were resumed 1828 by his nephew H. Packh, who continued his uncle's design. The first sketch (*entwurf*) for this colossal building is said to have been made by the prince bishop Alexander Rudnay, primate of Hungary. The cathedral was inaugurated September 1856; *BUILDING NEWS Journal*, iii, 1115.

20. 68. 69.

KUEMELKE (HANS), with his son MATTHIAS, built 1446-86 the Nicolaikirche at Zerbst, in Anhalt-Dessau.

92.

KUENG (ERHARD) *baumeister*, completed the münster at Bern, where he also executed an alto-relievo of the Last Judgment, bearing the date 1495. MEYER, *Conversations Lexikon*, Svo., Hildburghausen, 1851, xix. HEINZ.

68. 116.

KUFFER or KUFR, in Syria, see DOOR (STONE).

KUFT, KOBT, KOPT, or KEPT, the ancient COPROS in Egypt.

KUGLER. The successor to W. Kreglinger, on the works to the S. Georgskirche at Noerdlingen, in Bavaria, was HEINRICH KUGLER, according to OTTE, *Handbook*, Svo., Leipzig, 1854, p. 173, who states that he was succeeded by S. Weyrer; and FIORILLO, *Geschichte*, Svo., Hanover, 1815-20, putting his date after 1480, says that he is sometimes called Aechser. But NAGLER and MÜLLER (the former calls him GEORGE) seem to intimate that no one held the appointment but himself, as successor to N. Eseller in 1480.

68. 69. 92. 116.

KULLUS. The term used in Hindostan for the ball or finial on the roof of a temple; TOP, *Annals*, etc., 4to., London, 1829, ii, 396, 661, 709.

The *sikra* (*sechara*) or sort of spire of the *vimana*, curvilinear in outline, is, in all the older temples of Northern Hindostan, surmounted at the top by an ornament like the stopper of a pickle bottle, called *amla sila*, which rests generally on eight monsters and supports a flat dome, on which is the *kullus* (*kulsa*) or pinnacle, which takes the form of a vase, a lotus, or a combination of any of the emblems of the god to whom the temple is dedicated, as the trident of Siva or the discus of Vishnu; FERGUSSON, *Pict. Illustrations*, fol., London, 1847, p. 16.

KUMBH, PACH, STAMBH, and TAMBH. Terms used in Hindostan for pillars, such as are shown in KITTOE, *Indian Architecture*, fol., Calcutta, 1838, pl. 20.

KUNAWÂT, the ancient KENATH. A ruined city in Syria,

situated on the left bank of a deep ravine, about a mile in length and half a mile in width. The ancient walls; vast ruins of private houses, solidly and elegantly built, the stone doors panelled, with moldings, wreaths, etc.; an aqueduct; a vast reservoir under a spacious area covered with large and closely jointed flags; the ruins of a palace; fine porticoes; ruins of a small temple with vaults; a hippodrome with statues; tombs like those at Palmyra; a large private house with a courtyard having galleries supported on columns; a church with nave and aisles of a late period; a theatre nearly perfect excepting the front wall, with nine ranges of benches, the lowest being 5 ft. above the arena, which is 63 ft. diameter; a small temple over a reservoir; a massive tower of rustic masonry, with stone doors of great beauty, one of them showing traces of a lock and a keyhole; the lower part of a circular tower 84 ft. in circumference, and several others; a peripteral temple 78 ft. long by 48 ft. wide, having a cell 45 ft. long by 30 ft. wide, with pilasters along the wall and columns 36 ft. high, of the Corinthian order, standing on square pedestals 6 ft. high; with other details of the remains, are described with a sketch plan of the city and some other woodcuts, in PORTER, *Five Years in Damascus*, Svo., London, 1855, ii, 90-115. BURCKHARDT, *Travels in Syria*, 4to., London, 1822, p. 86; DONALDSON, *On Discoveries in the Hauran*, etc., in INST. OF BRIT. ARCHITECTS, *Transactions*, 1860-61, p. 122.

KUMMER (PETER) of Dresden, *baumeister* to the elector Augustus, was commissioned 1555 by the government to build the royal palace at Berlin, but according to NICOLAI he was recalled in the same year.

69.

KUNGAVAR, in Persia, see KONKOBAR.

KUNGURA. One of the terms used in Hindostan for ornamental balustrades and parapets. GULDAR.

KUNKUR. A variety of limestone obtained over a large part of Hindostan, though it is scarce in Bengal. It is mostly nodular, always of fresh water and recent formation, and in many cases in the act of being formed. While sometimes found in thick stratified beds like the travertine near Rome (and seems in this case to have been formed by calcareous springs), it is more generally found a few feet deep in clay or alluvial soil, in small pieces varying from the size of peas or filberts to that of the hand. It is occasionally used as a building stone. The more recent varieties seem to be formed by the agency of the rains; when the earth abounds with vegetation, the tepid waters are charged with fixed air and dissolve the lime prevailing in the soil everywhere around, the mineral being again thrown down as the advancing season dispels the excess of gas. In this state it absorbs the clayey matter around, and cements it into kunkur. It is composed of 72 parts of carbonate of lime, 15 of sand, and 11 of clay and oxide of iron. These nodules being collected, are placed with fire-wood in small sized conical kilns, and burnt in the usual way. Mixed with half its weight of river sand, it makes an excellent mortar; burnt in pieces of about a cubic inch in size, and then reduced to powder before slaking, it forms a first-rate water cement, setting in a few minutes and becoming as hard as stone. At Poonah the finer varieties are burnt with charcoal, in kilns only 2½ ft. high and about as much in diameter at the base. They hold about a cubic foot of material or about 36 lbs. of charcoal and kunkur in equal parts. When burnt it is slaked, and then made up into bricks, which are sold in the bazaar for the purpose of whitewashing; *BUILDER Journal*, 1850, viii, p. 386; *ILLUSTRATED BUILDER Journal*, 1865, p. 174. CHUNAM.

KUNNARUE, in Hindostan, see KANARAK.

KUTAIFA. One of the terms used in Hindostan for spandrel ornaments. GUL.

KUTHERA. One of the terms used in Hindostan for ornamental balustrades and parapets. GULDAR.

KUTAIS, KOTAI or KOUTAIS. The ancient Cotatis or Cotaiss, situated on the right bank of the river Rioni, was the capital of the ancient Imeretia. It is now little more

than a heap of ruins, among which lie broken columns, and capitals covered with inscriptions. A stone bridge leads to the modern town of Kutais, situate on the left bank of the river. There are six churches, a seminary, a public garden, a market-place in the centre of the town in the form of a large amphitheatre, and the residences of the governor of the province and of a bishop. The cathedral, founded 1008-14, and finished 1027-72 by the architect Maisa, is an excellent specimen of the Armenian Byzantine style: it has neither coupled piers nor pointed arches; but presents externally reed-like pilasters and elaborate frets, such as were employed at Ani in the course of the same century: FERGUSSON, *Hist. of Architecture*, 8vo., London, 1867, ii, 340, gives one of the windows from DUBOIS DE MONTPEREUX, *Voyage en Caucase*, 8vo. and fol., Paris, 1839-43, as exhibiting the Armenian style of decoration of that age, not employed before that time, though with various modifications it became typical of the style at its period of greatest development. DUBOIS gives pl. 13, views of the front and of the choir; pl. 14, elevation of the choir; pl. 15, the plan; pl. 16, details, and pointed arched door of entrance, dated 1009; pl. 17, details, font, etc.; and pl. 18, windows and string courses. He considers, ii, 169-200, the details to have been copied in the church dedicated to the Virgin at Ghelathe or Gelati, about ten miles distant, in which church the plan was copied from that at Pitounda. In that convent is one leaf of an iron gate, 13 feet high by 6 ft. wide, having a Coptic inscription dating from the time of the emir of Tabin, and stating that it was brought from Ani; WRAXALL, *Schamyl*, 12mo., London, 1854, p. 24. 50.

KWANGCHAU-FOU, or Sing-ching, in China. The native name of CANTON.

KWIEFON (. . .), baumeister, constructed (*aufgeführt*) 1474 the tower of the castle at Tuhoraz, near Böhmisch Brod, in Bohemia. DLABACZ, 1783, saw a stone set in the tower which contained that statement. 20. 68. 116.

KYAN'S METHOD OF PRESERVING TIMBER, etc. A process patented in 1832 by J. H. Kyan. As early as 4 March 1828 he submitted timbers to the process, which were examined in 1831 and in July 1833. In 1832 specimens were tested in the fungus pits at Woolwich dockyard, which stood the trial satisfactorily. In 1835, the paling of Regent's-park, London, was prepared by the process; as also the timber for the Oxford and Cambridge Club, designed by Sir R. and S. Smirke; the Temple in 1833; the Custom house, Bristol, by S. Smirke; the British Museum; the National Gallery, by W. Wilkins; the College of Surgeons, 1834, by C. Barry; the Westminster Bridewell, by R. Abraham; and Ramsgate harbour, by A. Turnbull, C.E. S. Beazley reported on the state of the palings in the Regent's Park in January 1836, and again in 1838, as stated in the *CIVIL ENGINEER Journal*, i, 192. It came into use for sleepers, timber viaducts, etc.; was introduced into Holland, and into Austria; and eventually, about 1837, the patent was purchased in England and worked under the title of the Anti Dry-Rot Company, Kyan's patent; *CIVIL ENGINEER Journal*, vi, 205-6; 253; 306; 356.

The railway bridge of Kyanized timber, erected 1848 at Newport over the river Usk, was set on fire by the insertion of a bolt, heated to a higher degree than usual, the "pickling having made the timber like gunpowder to ignite;" ILLUSTRATED LONDON NEWS *Journal*, xii, 371. The efficacy of Kyanizing was questioned by Murray of Hull, 1850, in a letter to the *MINING JOURNAL*, reprinted in the *ARCHITECT Journal*, ii, 190. It is said that in Guiana, Kyanizing preserves only the outside; a post may look very fair, but will often yield to the pressure of the fingers, from dry rot and the ravages of ants; and in England this process has failed in protecting timber from worms when exposed in sea water; *CIVIL ENGINEER Journal*, xx, 16.

ARCH. PUB. SOC.

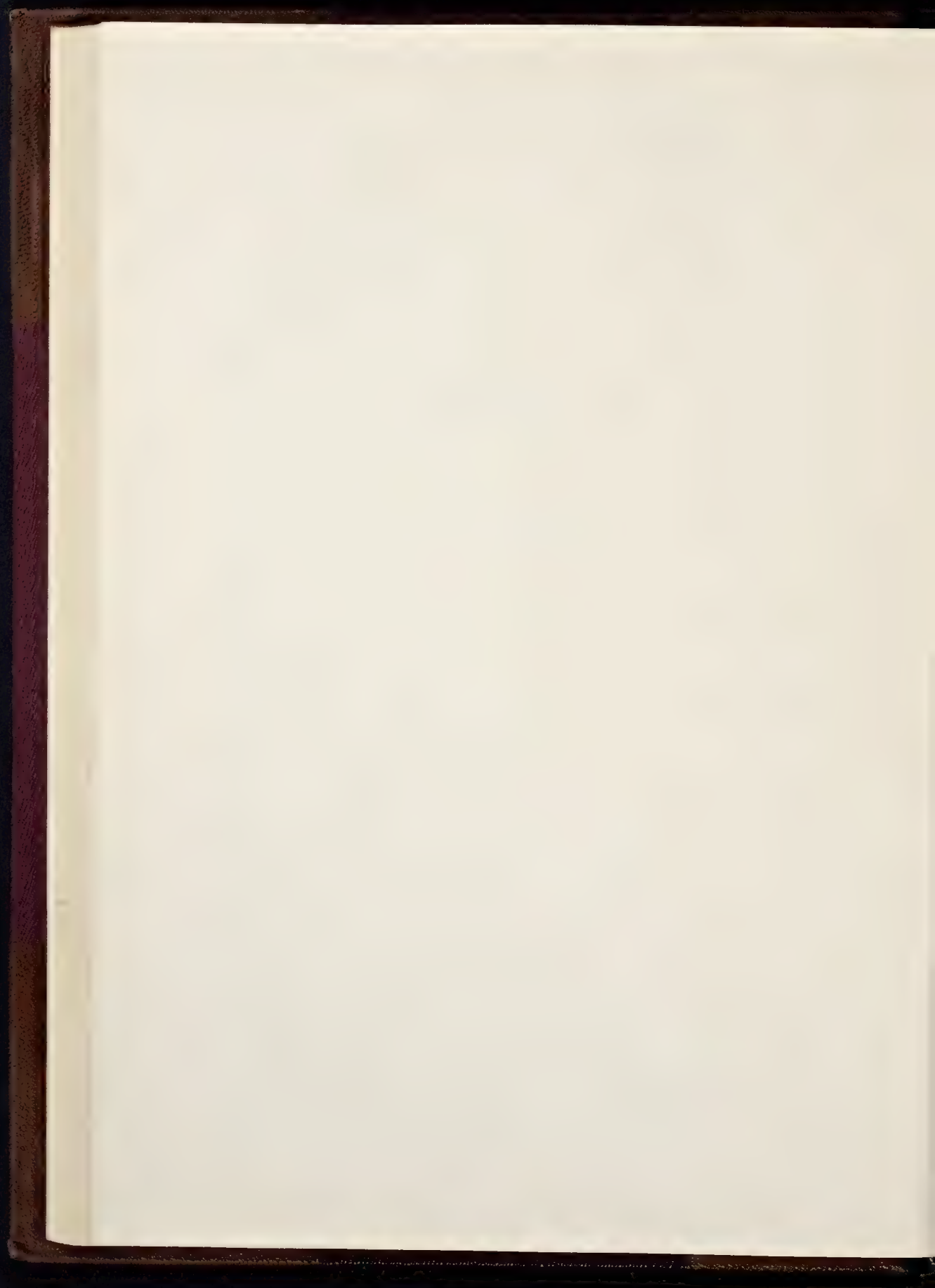
The process, called Kyanizing, consists in laying timber or canvas in a solution of bichloride of mercury (corrosive sublimate); or injecting it by pressure into the pores of timber, when uniting with the albumen it formed an insoluble substance not affected by wet. The solution has been detected by chemical tests to a depth of $\frac{1}{8}$ to $\frac{1}{4}$ of an inch in various woods, rendering it doubtful whether the proper action does always take place; it appears to penetrate fir timber less than some other woods. The material thus treated becomes of less specific weight, and less flexible, but more brittle. The process is now nearly abandoned, on account partly of the difficulty of forcing the solution into the wood; partly also of the deadly nature of the material, one of the strongest poisons known; partly of the expense; but chiefly on account of the success of the creosoting process (BURNETTIZING).

"A peculiarity of oak, owing to its chemical principles, is that less alteration on the solution of the corrosive sublimate may be expected to be produced by it than most other woods, for this reason, that gallic acid does not decompose bichloride of mercury. It is worthy of remark, however, that gallic acid solidifies albumen, and therefore in this wood, that process is effected by nature, which man is obliged to accomplish by artificial means for other trees, and hence one of the causes of the durability of the heart timber of the oak; it is quite necessary to apply the solution to the outer layers or sap wood, which is as liable to decay as any other kind of timber;" DICKSON, *Lectures on Dry Rot*, 8vo., London, 1837, p. 24, who adds documents attesting to the efficacy of the process in 1834 and 1837: *Report* by Capt. ALDERSON, Dec. 1836, in the *Papers of the Corps of Royal Engineers*, 4to., London, 1844, i, p. 126, with a plate of the tank used; the *Lectures* by Prof. FARADAY at the Royal Institution in February 1833; by Dr. Birkbeck at the Society of Arts, 9 December 1834; and by Dr. Dickson at the Institute of British Architects, April 1837, and 26 March 1838, as printed in *CIVIL ENGINEER Journal*, 1838, i, 191. AIDE MEMOIRE to the *Military Sciences*, 8vo., London, 1845-52, ii.

One pound and a half of corrosive sublimate (costing six shillings in 1837) was used to each load, or 50 cubic ft. of timber; or 1 lb. to 15 gals. of water (not five, as stated *s. v.* CORROSIVE SUBLIMATE). The method of Kyanizing timber, by exhaustion and pressure, as described at the Institution of Civil Engineers, 1841-2, is given in the *CIVIL ENGINEER Journal*, iv, 284; v, 202; when three-quarters of a pound of corrosive sublimate sufficed to prepare a load of timber; 1 lb. of the former was mixed with 2 gals. of warm water; the clear solution was drawn off and water added to it until diluted to the proper point, which was ascertained by a hydrometer; a more perfect test is the action on silver, which is turned brown at the requisite degree of saturation. The solution diminishes in bulk by use and not in strength. Deals require to lay in open tanks three days, and an extra day for every inch in thickness; same *Journal*, vi, 205. The action of the solution on iron is very destructive, consequently the tanks must be framed together, not nailed or bolted; the use of iron work in Kyanized timber has therefore been greatly questioned.

KYLAS. "The most splendid excavation in India", formed at ELLORA in the province of Aurangabad, in the first half of the ninth century. It is a temple surrounded by a court all cut out of the solid rock, the floor being 270 ft. long and 150 ft. wide; FERGUSSON, *History*, 8vo., London, 1867, ii, 578-82.

KYNASTON (THOMAS) was appointed to the Board of Works 4 May 1715 by warrant under the king's sign manual, as clerk of the works at the Tower of London, and Denmark (afterwards Somerset) house, *vice* J. Neagle and J. Vaughan, with a salary of £45 for each office; he held them as late as 1755; in 1718 he was also clerk to the controller, with a salary of £50 per annum.



THE DICTIONARY OF ARCHITECTURE.

LABA

LABACCO (ANTONIO), sometimes written Abacco, was a pupil of A. (Piccone) di San Gallo, and appears to have been resident from about 1506 at Rome for forty years. He engraved some plates of his master's design for S. Peter's church (two elevations are in the King's Collection, British Museum), and made 1547 a model of it on the plan of a Latin cross, still preserved in the octagon of S. Gregorio at Rome; it is 35 palms long, 26 palms wide, and 20½ palms high, as described in VASARI, *Lives*, 8vo., London, 1851, iv, 19, s. v. San Gallo. He designed the doorway in the façade of the palazzo (designed by M. Luzzi) of the principe di Carignano, in the district of Trevi at Rome, as given in FERRERIO and FALDA, *Palazzi*, fol., Rome, n. d., b. ii: and published *Libro d' A. L., appartenente à l'Architettura nel qual si figurano alcune notabili antichità di Roma*, 36 plates, fol., Rome, 1557: this is the date usually given, but there was probably [1552] an earlier edition, and there is a later one having the date 1568 in the text. It was also re-engraved as *Architettura Antica Romana*, fol., Venice, 1576, having the shadows reversed. This work, although not wholly reliable, is very valuable as recording details not noticed by any authors of the sixteenth century or later.

LABADIE or **LABADYE** (JEAN BAPTISTE AUGUSTE) was born 1777 at Paris, and studied architecture under Delespine. The *Projets d'Architecture—Grands Prix*, fol., Paris, 1806, contains two designs for which second prizes were awarded 1800 to him, one for a prytaneum (pl. 89-91), the other for a cenotaph to Newton (pl. 97-9); he also obtained 1802 the departmental prize for a triumphal arch commemorative of the Peace of Amiens, and 1803 that of the Institut for a design for a saloon for the fine arts. Among many other designs by him is one for a monument to general Desaix, engraved by Hibon in DETOURNELLE, *Recueil d'Arch. Nouvelle*, 4to., Paris, 1805, pl. 23. Before 1831 he had designed the theatre at Havre, the dwellings on each side, with the decoration of the *place* in front of the theatre, a public fountain at the head of the bassin d'Ingouville; and restored the bell tower of S. Martin at Harfleur, in Normandy. About 1837 Labadye kept a school, and gave lectures on architecture, at Paris where he was living in 1850, and probably died before 1854. He was a member of the Legion of Honour, and chevalier of the order du Mérite-du-Lion-d'or de Holstein-Limbourg. 68. 69. 110. 114. 116.

LABARRE (ELOI), **LA BARRE** (E. DE), and **DE LA BARRE**, was born 17 August 1764 at Ourscamps (Oise), in France. He became a pupil of the academy, and of Raymond. The *Projets d'Arch.—Grands Prix*, fol., Paris, 1806, pl. 3; 51-2, contains two designs for which prizes were awarded to him; one 1791 for a theatre, the other 1797 (the earliest second grand prix) for a public granary. In 1800 he obtained the first prize from 28 others in the competition for laying out

LAEB

the site of the château-trompette at Bordeaux, but which not being carried out he was paid 10,000 francs as a compensation. He designed 1805 the column of the grande armée at Boulogne-sur-mer, 174 ft. high including the statue, as given in GOURLIER, *Choix d'édifices*, fol., Paris, 1850, iii, pl. 119-20, 384; it was completed 1840 by Henry: also 1827 the theatre at Boulogne; and after the death of Brongniart, he finished 1813-27 the bourse and tribunal du commerce at Paris, given in the same work, i, pl. 61-3. He was elected 1826 member of the académie royale des beaux arts or Institut. He was a member of the Legion of Honour, and honorary member of the conseil des bâtimens civils, and died at Vitry 20 May 1833 aged 69 years. J. C. A. Baron, E. J. L. Grillon, and the brothers Gasse of Naples, were among his many pupils. He wrote a pamphlet, *Mémoire et projet sur la restauration du Panthéon François*, 4to., Paris, 1798. INSTITUT DE FRANCE; Académie royale des Beaux Arts; *Funérailles de M. de la Barre, par M. Le Bas*, 4to., Paris. LA PROPRIÉTÉ *Journal*, 4to., Paris, 1833, ii, 8-9.

In 1854 a Labarre was architect to the department of Ardennes and living at Charleville.

LABEL (Ger. *sturzgesimse*). The name now generally given to the projecting molding by the sides, and over the top, of square headed openings in mediæval architecture. There has been much controversy as to the proper application of the word. DRIPSTONE; HOOD-MOLD.

A. A. The ECCLESIOLOGIST *Journal*, 8vo., London, 1843, 1st series, ii, 171, suggests that "labels were added because from their universal adoption externally, they came to be considered an integral part of a window; and there is no doubt that a window arch is meagre without this addition (of a dripstone)—probably for much the same reason they are generally found over pier arches. Additional lines are thus gained, and a much greater appearance of depth and effect is thereby given to the moldings of the archivolt." FREEMAN, *Window Tracery*, 8vo., Oxford, 1851, 274, pl. 71, gives the west window of Caldicott church, Monmouthshire, in which the label follows all the curves of the tracery (the containing arch being omitted), and is cut square at the top. The chancel windows exhibit the ordinary foliated ogee couplet of the South Welsh churches, with a label over, following their external curves and cut square at the top.

LABELYE (CHARLES) as he wrote his name in his publications; but called Charles de Labelye by HAWKSMOOR in *London Bridge*, 4to., London, 1736, p. 18-9; and M. L'ABELLAYE as written in GENTLEMAN'S MAGAZINE, 1754, p. 588; was born in the early part of the eighteenth century, in Switzerland according to his own statement in his publications; in Burgundy, in France, according to some authors; at Vevay, in Switzerland, as stated by other authorities. It is supposed that he was brought over, or sent for, to furnish a

design for a bridge across the river Thames at Westminster. Drawings were received in May 1738 by the Commissioners appointed, when Labelye's plan was strenuously supported by H. HERBERT, ninth earl of Pembroke, against those by Hawksmoor, B. Langley, J. James, and others; he received 10 May the appointment of "engineer"; the first pile was driven 13 September; the first stone laid 29 January 1738-9; a new design for a stone bridge presented to the Board 12 March 1739-40; and the last stone laid 25 Oct. 1746. This bridge, opened after the rebuilding of one pier and two arches 18 November 1750, consisted of fifteen arches of Portland stone, the centre one being 76 ft. wide, the others 72 ft., 68 ft., 64 ft., 60 ft., 56 ft., 52 ft., and 25 ft., and was 1220 ft. long and 44 ft. wide on the soffit of the arch. Instead of piling the whole foundation, the piers were built in *caissons*, floated to the prepared sites and sunk with the weight of stone placed upon them. The head mason was Andrew Jelphs. This bridge is usually stated to have cost £218,800, and the approaches, inclusive of Bridge-street, £170,700; but a *Return* made in 1863 states that the total sum was £393,189, of which £145,057 went to the contractors, £248,132 to other parties, and £109,054 was paid for the approaches. This structure was taken down 1861 for the present bridge by T. Page, C.E.

DUSSEUX, *Les Artistes Françaises*, 8vo., Paris, 1856, and MARIETTE, *Abecedaire*, 8vo., Paris, 1853, iii, 29, state that Labelye was called to France for the special purpose of this construction, the great breadth of the river, as well as the effects of the tide, presenting difficulties almost insuperable; that for the driving of the piles he employed mechanical implements hitherto unknown in England; and that having achieved the work within twelve years he was abruptly dismissed, and returned to France complaining of the treatment he had experienced. According to FÜSSLER, it seems that Labelye submitted to the commissioners as his own an invention of a certain James Vauloué, who publicly exposed the plagiarism: but Labelye in his work says (p. 27), "the method made use of to drive the piles was contrived by the late James Vauloué, a very ingenious watchmaker of my acquaintance, who has published a print of the engine, with an explanation"; this was drawn by Gravelot and engraved by Toms, 1738, in which year the Royal Society awarded their medal to him for this machine. The supposed original design for the bridge, drawn in perspective with Indian ink on vellum, is preserved in the CROWLE PENNANT, in the British Museum, viii, 52.

Labelye published *A Short Account of the Methods made use of in Laying the Foundations of the Piers of Westminster Bridge*, 8vo., London, 1739, with plates; and *Description of Westminster Bridge*, 8vo., London, 1751; which states that in 1744 he had proposed to publish in two volumes an elaborate account of its construction.

GEOPHYRLOGIA, *An Historical Account of Bridges Antient and Modern*, 8vo., London, 1751, gives a view of the bridge; as also BRITTON and PUGIN, *Public Edifices*, 8vo., London, 1828, ii, which shows the alcoves above twelve of the piers, remarkable for their peculiar acoustic property of transmitting sound from one side of the bridge to the other, as noticed in PERCY, *History of London*. 68. 69. 116.

In the summer of 1743 he was riding between Cambridge and Lynn; and in June 1745 he "obtained leave of absence" from the bridge commissioners, on behalf of the duke of Bedford, etc., governors of the corporation of the great level of the Fens, to make a report; this was given in *Result of a View of the Great Level of the Fens*, 4to., London, 1745 (nearly reprinted by WELLS, *Account of — Draining Lands*, etc., in SURVEYOR, ENGINEER, etc., *Journal*, 4to., London, 1843, p. 145-6). A plan of the intended harbour between Sandwich town and Sandown castle, C. Labelye del., engraved by Harris, dates about 1744; GOUGH, *British Topography*, 4to., London, 1780, i, 738-40. Another work is entitled *Abstract of Mr. C. L.'s Report, relating to the improvement of*

the River Wear and Port of Sunderland in 1748, 4to., Newcastle-upon-Tyne (1748?). Labelye died 18 February 1762 in Paris, whither he had gone for his health according to WALPOLE, *Lives*, etc.

LABNA or LABNAH. One of the ruined cities of Yucatan, in Central America. STEPHENS, *Yucatan*, 8vo., New York, 1843, ii, 49-62, details all the monuments then existing, with illustrations of many of them; such as a mound 45 ft. high on which was a building 43 ft. wide and 20 ft. deep, and some 40 ft. in height, the upper part being once covered with colossal figures and designs in stucco. A few hundred feet distant is an opening forming an archway by stones overlapping one another, 10 ft. wide, remarkable for its proportions and ornament, with other ruins in front, and a large courtyard in its rear. About 150 yards north-east of the mound is a large building on a terrace; and still further is "a grand and, without extravagance, the really magnificent building represented in the frontispiece to this volume." It stands on a terrace 400 ft. long and 150 ft. wide, which is covered with buildings; the front is 282 ft. long, of three distinct parts, differing in style. There is another building on the top of this one. Other vestiges and mounds exist, but in a ruinous condition. The above-named gateway is also given to a larger scale in CATHERWOOD, *Central America*, fol., London, 1844, pl. 19.

LABORATORY, formerly written ELABORATORY. A place where chemicals are prepared or analysed. The architect is seldom consulted on its construction, as almost every one is of the simplest fabric, and the internal arrangements depend entirely on the peculiar nature of the trade or manufacture of the owner. It should be spacious, lighted if possible from the roof, and above all well ventilated, the noxious vapours being carried off by special conductors so as to pass through furnaces or over fires. In large establishments one or more counting-houses are added, also several private rooms for patented, or secret, processes. There should also be an engine-room and stokery; stores for coals and drugs; and a large and thoroughly effective chimney-shaft. An ample supply of water should also be provided from the most convenient and purest source available. A light timber roof is best, as iron becomes corroded by the vapour of the chemicals: where appearance is of no moment it should be frequently tarred to resist the moisture of the steam. The walls are best of plain brick, and the floor either of brick or foot tiles, as attrition may produce sparks from stone paving, and ignite the combustible or explosive materials often used. The pavement should be laid with a good fall, and with ample channels so as to be easily washed. The drainage should be abundant and thoroughly well trapped. Where the refuse is valuable for manure, or noxious to streams or other channels of dispersion, large tanks should be provided as stores, to be emptied as occasion may require.

A. A.

The requisites for the proper arrangement of, and the necessary instruments for, a laboratory may be seen at length in FARADAY, *Chemical Manipulation*, 3rd edit., 8vo., London, 1842. The plan of the laboratory at the University College, London, designed 1845 by T. L. Donaldson, is given in the *Builder Journal*, iv, 139.

The laboratories and chemical schools constructed in Germany since that built about 1840 at Giessen for baron Liebig, as at Breslau, Königsberg, Greifswald, Halle, etc., are extensive; but the two most complete, as well as the most recent, establishments are the chemical laboratories erected at Berlin and at Bonn under the direction of Dr. A. W. Hofmann. The reader will find, in the following notice of the structure at Bonn, some passages included by crochets [] which are interpolated from the description of that at Berlin, while others between brackets { } do not seem to be comprised in the metropolitan accommodation.

The laboratory at Berlin was commenced 1865 from designs



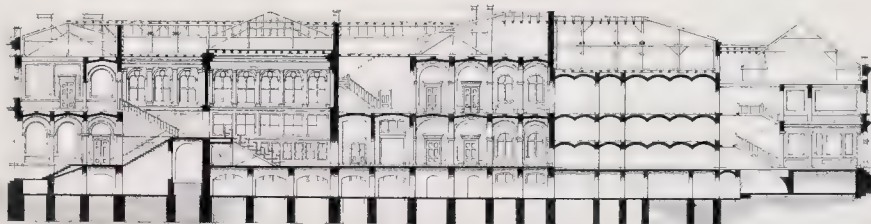
LABORATORY



P is an \mathcal{A} -free $(\mathcal{A} \otimes \mathcal{A})$ -bimodule and $[P] = 0$ in R .



Plan of Upper Floor

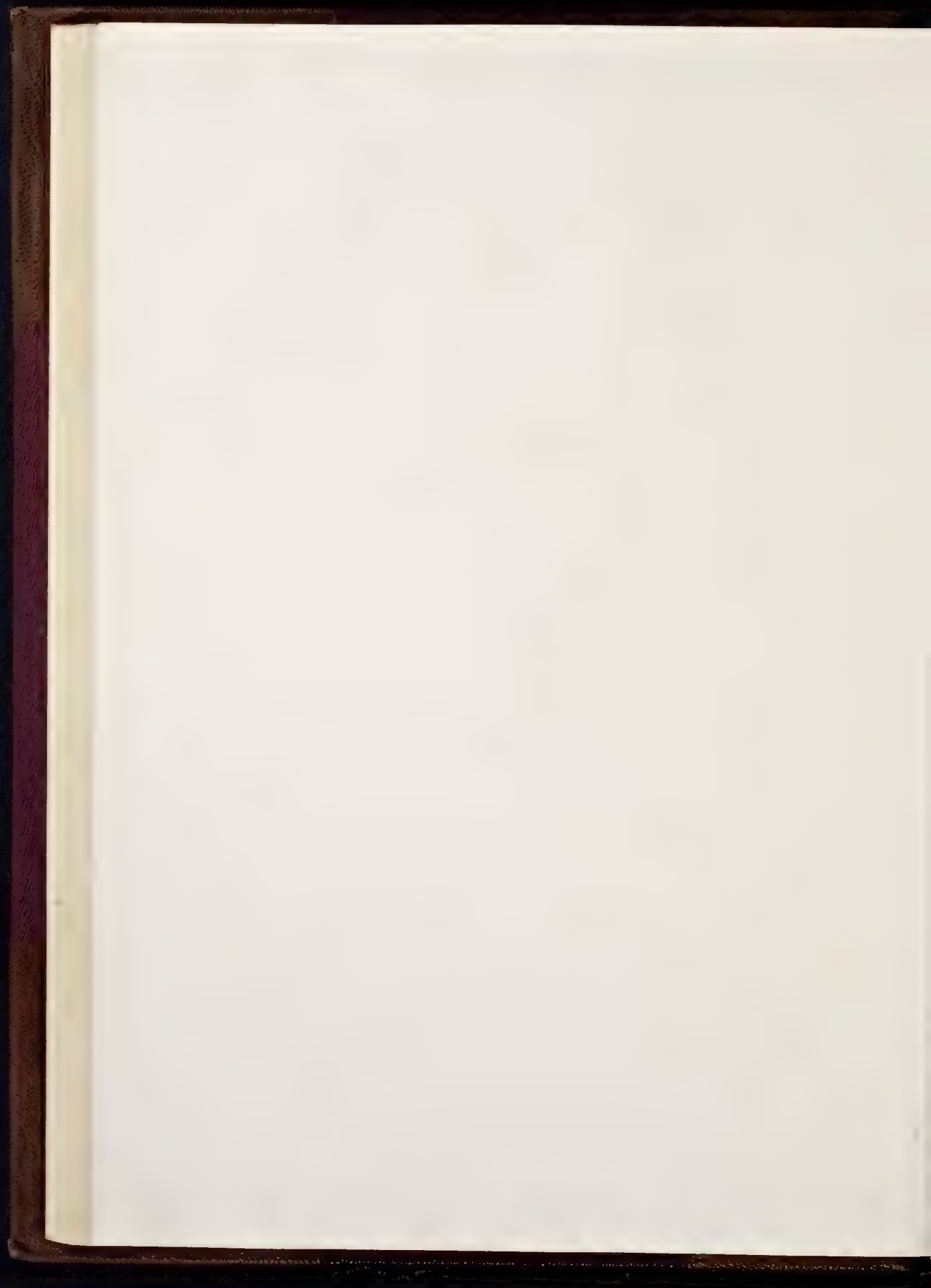


Section on Line A.B

1. The first step is to identify the main topic of the document.

100 Rhemish feet = 10.25 English feet

From Dr. Hermann Report and
Germier, aus Neue Chemische
Laboratorium Zu Berlin 1868



made by A. Cremer, architect to the university, who had recently erected the anatomical school, perhaps the most complete institution of the kind in existence. The estimated cost for the building having been £23,365, and for the internal fittings £3,750, the total grant of the Prussian government, including the cost of the site, was £47,715. The building, exclusive of three courts, occupies an area of 21,680 square ft.; the frontage to the Georgen-strasse being 134 ft., and to the Dorotheen-strasse 67 ft., with a depth of 284 ft.: at Berlin the ground and first floors average respectively 18 ft. 5 ins. and 17 ft. in height.

The laboratory at Bonn was commenced 1865 from designs made by Augustus Dieckhoff, architect to the university, on a programme arranged in conjunction with him by Dr. A. W. Hofmann, the result of the study of the plans of nearly every existing laboratory, and visits to nearly all those in Germany; the amount of the contract was £18,450. The institution, intended to provide accommodation for sixty students, occupies an area of 45,000 square ft., or exclusive of the four courts of 28,300 square ft.; the frontage being 180 ft., with a depth of 250 ft. The working establishment is comprised on the basement and ground floors: the front block of building, 180 ft. in frontage, alone having an upper story, which is occupied by a magnificent suite of apartments for the director.

At Bonn, the basement (which is 12 ft. high) comprises store-rooms for dry, solid, and liquid reagents; and for the large stock of glass and porcelain: steam-boiler room and washing establishment: laboratory for physiological chemistry; accommodation for the medico-legal investigations; with stable or [hospital] attached for animals undergoing chemo-physiological treatment: large workshop for the rougher work of preparation for the lectures, etc.; {with a well ventilated niche for the reception of the large galvanic battery, which serves the electric lamp of the lecture table;} and ample provision for stores, coals, etc. Besides these, at Berlin there is provided a heating apparatus, and the domestic offices connected with the apartments of the resident officers.

At Berlin, on this floor are, repositories for condensed gases, and explosive, corrosive, and poisonous compounds, etc. At Bonn, this story also contains apartments which are on the level of the ground at Berlin; viz. furnace rooms, for smelting and other similar operations on a large scale, provided with numerous furnaces (having flues rising about 60 ft. to secure a powerful draught), and with special arched niches let into the wall and provided with strong iron doors for the protection of the manipulator in the case of explosion when experimenting with substances at high temperatures in sealed tubes and under great pressure.

At Bonn, the ground floor comprises spacious vestibules, corridors, etc., arranged around the quadrangles. The front or south block is devoted to the scientific collections: e.g. the mineralogical and chemical museums (56 ft. 2 ins. long and 25 ft. 9 ins. wide at Berlin); a small lecture theatre for special subjects; with vestibules and principal staircase: the east wing of the first quadrangle is appropriated to the apartments of the assistants and officers: the west wing to the private laboratory of the director, 40 ft. by 16 ft., and other apartments connected therewith, and specially appropriated to his use. The central block dividing the two southern quadrangles is occupied by the great lecture hall, capable of holding 250 students, 40 ft. square by 23 ft. high [37 ft. high at Berlin] with its dependencies, such as the laboratory of the lecture assistant; store-rooms for apparatus, models, diagrams, etc.; lecturer's receiving room; cabinet for deposit of lectures; registers of students, etc. The buildings surrounding the two northern quadrangles are exclusively devoted to the purposes of practical instruction in chemical analysis and research. [Besides a preparation room 32 ft. 3 ins. by 20 ft.] there are three laboratories, each 54 ft. long by 22 ft. wide [48 ft. long by 31 ft. wide] and 17 ft. high, and each providing 20 [24]

students with sufficient space and convenience for work; the rooms being respectively appropriated to *beginners*, who become exercised in chemical manipulation, and go through a course of qualitative analysis; to *advanced students*, who are occupied with quantitative analysis, both ponderal and volumetric; and to *young chemists*, engaged in original experimental investigations; which last at Berlin (for 16 students) is 47 ft. long by 24 ft. wide, with a combustion room attached. In these three laboratories the students have their permanent working places; to each is allotted a table, amply supplied with gas and water, and provided with locking drawers and cupboards in which to keep reagents, etc.: appliances for general ventilation, and the tubes for carrying off injurious liquids and gases, are provided for to the minutest detail; [on all the window piers are evaporation niches having flues to communicate with the open air; and in the other halls similar flues are provided.] In connection with the laboratories are closets for the preservation of delicate and costly apparatus, for platinum, and silver, vessels, expensive reagents, etc.: also three operation rooms, in which all experiments requiring large and complicated apparatus are conducted at benches fitted up for that purpose, or in the evaporation niches let into the wall: each operation room communicates with a covered colonnade well provided with gas, water, and other appliances. [At Berlin there is a colonnade 97 ft. long and 9 ft. 7 ins. wide, supporting galleries that supply accommodation for operations which could not be conveniently performed in the laboratories, ranges of drying ovens, well ventilated niches for ignition, etc.] The remaining rooms of this department are appropriated {to volumetrical analysis}: two balance rooms for the balances, air-pumps, barometers, and other delicate physical apparatus used in chemical researches: two rooms for fusions and ignitions: the library: and the laboratory for gas analysis, with its anteroom and vestibule; a photometric room is also provided at Berlin.

The above details, with plans and sections, are given in HOFMANN, *Report—on the New Chemical Laboratories of the Universities of Bonn and Berlin*, printed in the *Thirteenth Report of the Science and Art Department of the Committee of Council on Education*, 8vo., London, 1866. The laboratory at the Royal College of Chemistry, instituted 1845, in Oxford-street, where Dr. Hofmann practised before he left London, may also deserve attention.

A. C.

LABOUR (REMUNERATION OF), see DAY-WORK; PIECE-WORK; TASK-WORK; and WAGES.

A. A.

LABOUR AND NAILS. The method of measuring and estimating the value of work where the employer finds the bulk of the materials. This is often the case where the employer has stone quarries or brick-fields on his estate; or where he is a grower or importer of timber. In this case the work is generally measured as often as payment is required. Thus, timber framing is taken by the square and not by the foot cube. As the builder has no profit on the material, which of course is a very heavy item in a building, it is usual to allow him a somewhat better price on the labour and on the ironmongery and other things he may have provided, than where the work is entirely done by him, as he has all the trouble of the conversion of the material without the usual remuneration. The various items in labour and nails, which are very numerous, may be found in every Price Book. IAGE.

A. A.

LABOUR. The agency producing work other than that of actual machinery. In architecture, "manual labour," or that of the workman educated for the purpose, is generally considered. The details of this, as well as the division and subdivision of labour are given under the heads of their respective trades, and their various processes *passim*. For the philosophical considerations of the duties, responsibilities and rights of labour, the reader must refer to the various works of jurists and political economists, which are not only far beyond the scope of our work, but far too bulky in size and abstract in character.

A. A.

LABOUR (Day's). This term has been fully treated s. v. DAY; DAY-WORK; and DAYS'-WORK. A. A.

TILLY, *Notes on different kinds of Labour*, in the Papers of the Corps of Royal Engineers, 8vo., London, 1859, viii, 96-7, new series.

LABOURER. An assistant who brings to the skilled workman, materials, tools, etc., and otherwise helps him in the performance of his work. Masons', bricklayers', and plasterers', labourers are often called "hod-men", from the implement they use in carrying mortar, etc. HOD. These workmen are also frequently employed in erecting scaffolding, except by large firms, by whom a gang, generally men who have been sailors, are exclusively occupied for the purpose. SCAFFOLD. An inferior workman is sometimes engaged to assist carpenters, and is familiarly styled "bond-timber Jack." The joiners do not employ labourers. The wages of the labourer as compared with those of the skilled workman is about as 3 is to 5. WAGES. A. A.

LABOURING POOR (DWELLING FOR THE). For the agriculturist, see COTTAGE; and FARM BUILDINGS; for the manufacturer and working man, see WORKMEN'S DWELLING.

LABRANDA, in Anadolia, see JACKLY.

LABRUM. The large vessel of the warm bath among the ancients. A full description is given in the DETACHED ESSAY, *Baths and Washhouses*, p. 3, with an illustration from MERCURIALLI. Several very large specimens have been found in Italy, composed each of a single piece of granite or marble: they have generally an overhanging lip (*labrum*). One in the Vatican is a monolith of porphyry, 42 ft. 6 ins. in circumference. A. A.

The name *labrum*, like *CANTHARUS* and *nymphæum*, seems to have been also given to the basin of water, which occupied the centre of the *paradisus* or *atrium* of the early Christian churches: according to SCHAYES, *Hist.*, 12mo. Brussels, 1850, i, 67.

LABURNUM WOOD, see CYTISUS.

LABYRINTH (Gr. *λαβύρινθος*). A word supposed by some to be of Egyptian etymology, but probably derived from the Greek *λάβρος*, one of the significations of which is great, huge; thus PINDAR, *Nem.*, viii, 80, has *λάβρον λίθον* as an immense stone put up to commemorate a victory. It also signifies a construction full of winding, tortuous, passages intended to mislead any intruder, and to cause him to lose his way; STRABO, viii, 6, speaks of *σπηλαια* or caves at Nauplia as labyrinths, and calls them Cyclopean. Whether of regular or of irregular plan, the whole or some part seems to have been of subterranean construction and it is probable that they were originally stone quarries. By metonymy the term is applied to any intricate argument, as by Socrates, in PLATO, *Euthyd.*, edit. Bekker, iv, 142.

The most celebrated of all these constructions seems to have been made in Egypt. This is particularly described by HERODOTUS, ii, 148. This historian states that it was erected by the twelve kings before the lake Moeris near the city of crocodiles (? Arsinoë) as a commemoration of their fame; and that in his opinion it exceeded all that had been said of it, surpassing the temples at Ephesus and at Samos, and even the pyramids themselves. Twelve covered courts, six to the north and as many to the south, with entrances opposite to each other, all enclosed by one wall; fifteen hundred subterranean apartments, which he was not allowed to see, because in them were preserved the sacred crocodiles and the bodies of the royal founders; as many chambers above ground which he did examine, and considered to rank amongst the greatest efforts of human industry and art; ceilings and sculptured walls of white stone, a material employed for the pillars of the courts; these are details which may be comprehended: but very dubious is the information that the almost infinite number of winding passages through the different courts excited his warmest admiration; and that from spacious halls he passed

through smaller apartments, and from them again to large and magnificent courts, almost without end. His account terminates with an assertion which ought to determine the site of this construction; he says that at the point where the labyrinth terminated there was a pyramid 40 orgyæ (about 240 ft.) high, having large figures of animals (*i. e.*, hieroglyphics) engraved on its outside; and that the entrance to it was by a subterranean path. Further allusions to this edifice are made by DIOD. SIC., i, 66; STRABO, xvii, 1; and PLINY, *H. N.*, xxxvi, 13. GARDNER WILKINSON, *Ancient Egyptians*, 8vo., London, 1847, i, 93; v, 157, supposes, with great reason, that by the lake Moeris, the canal of that name is meant, and that the site of the labyrinth was near the pyramid of Howara, where immense remains of buildings still exist; and some imagine that these chambers only served as immense reservoirs, a part of the vast system of preserving water for purposes of irrigation and domestic use. CANINA, *Arch. Egiziana*, ii, p. 208, has given a restoration of this vast place, but on very slight authority. It illustrates the classic description in a valuable way, but as it has no practical bearing on architecture, it may suffice to refer to his work and the other authorities on the subject. A plan and description is given in POCOCKE, *Descr. of the East*, fol., London, 1745, i, p. 61, who places it at the western end of the lake; and a description in PERRY, *View of the Levant*, fol., London, 1743, p. 381-5, who places it at the south-south-east of the lake.

Another labyrinth, celebrated by classic authors, is said to have been made by Dædalus, near Cnossus in Crete, for the abode of the minotaur, whose whole story is manifestly fabulous: there are, however, large caverns in that island, which may have given rise to the myth. A plan and description of such caverns near the ancient Gortys, are described by COCKERELL, in WALPOLE, *Travels*, 4to., London, 1820, ii, 402-6; SPRATT, *Travels in Crete*, 8vo., London, 1865, ii, 43-56; Tournepont, *Voyage into the Levant*, 8vo., London, 1741, i, 69; FALKENER, *Museum of Classical Antiquities*, 8vo., London, Sept. 1852, ii, p. 277-86; and STIEBER, *Reise nach der Insel Kreta* in 1817, 8vo., Leipzig, 1823, i, 510.

Labyrinths are also said to have existed in the islands of Lemnos and Samos: that in the former, said to have been supported by forty columns of great height and diameter, was commenced by Smilis of Egina, and completed about B.C. 776 by Rhæcus and Theodorus: the latter was a native of the island, and to him the credit of the labyrinth at Samos is given in PLINY, *H. N.*, xxxiv, 8; who also, xxxvi, 19, cites VARRO as authority that there was one in Etruria, the tomb of king Porsenna, but confesses that the whole account is a fable.

In mediæval times labyrinths are often mentioned, the most celebrated of which is called "the bower of fair Rosamond," but this is as much a myth as the tomb of the Etruscan Lars. In all probability such excavations as the catacombs at Rome, at Naples, and at Paris, have given rise to most of the stories about labyrinths. A. A.

Speaking of the eleventh century, RAMÉE, *Hist. Gen.*, 12mo., Paris, 1843, ii, 144, says, "La noblesse faisait établir dans ses châteaux obscurs et massifs une espèce de labyrinthe, dont Lambert D'ARDRES parle beaucoup dans ses ouvrages (voyez *Chronique*. Comité de Ghisn), dans MABILLON, *Annales Ordinis S. Benedicti*, fol., Paris, 1703-39, iv, s. a. 1052."

The labyrinthine figures observed in some churches, and in gardens, are described s. v. MAZE.

LABYRINTHINE FRET. A name given to a fret with a great number of turnings, from its supposed resemblance to a labyrinth. FRET; MEANDER.

LAC. The name of an insect; it is said to have been derived from the Indian word *lakh*, meaning figuratively any very large amount. The lac of commerce is the secretion of the insect, being formed in its cells, and found encrusted around branches or sticks, and is thence called *stick lac*; when separated from the resinous matter and pulverized, it becomes *seed lac*; other

processes convert it into *lump, plate, and shell, lac*. In India as in England, it is used as a dye for producing a permanent red colour, and also as a pigment and varnish combined, which resists the effect of cold water and does not wear off. It is used, when coloured with yellow orpiment, for making chains and other ornaments which are scarcely distinguishable from gold. As a dye it produces a colour equal to cochineal, and less liable to change from wet. It furnishes also the colour called by artists *LAC LAKE*. Shell lac enters largely into all varnishes and French polish; one of its most important uses being the production called "Jeffrey's marine glue" (*GLUE*). The lacquered or japanned goods of China, Borneo, and other parts, are manufactured from a liquor obtained by making incisions in the bark of certain trees, and not from the lac insect; ASIATIC SOCIETY, 6 May 1854. Lac has lately been employed by G. G. Scott, R.A., at Westminster abbey, to secure the friable particles of the decayed surfaces of interior stonework. Seed lac mixed with fine sand is used in England for making grindstones. Fuller's earth mixed with lime-water is used for washing seed lac before melting it into shell, to extract the colouring matter, which is left of an orange colour. The refuse of the shell lac left in the bags after the finer parts are extracted is called *kiree*; *BUILDER Journal*, 1852, x, 571.

LACBORACIC PAINT. A wash or paint rendered more durable than limewash, and cheaper than oil paint. Its inventor W. L. Scott in 1855, gives two methods for making it. 1. Boil together for half an hour, commercial shell lac 1 lb.; commercial borax (tincal) 1½ lb.; and water, 10 lbs. = 1 imperial gallon; allowing the solution to stand until quite cold, and then strain it through bags of a coarse material. The solution thus prepared should be mixed with from 6 to 8 lbs. of finely ground dry white lead (zinc white, or any other good white in an equivalent quantity) and raised once more to the boiling point, with constant agitation. When cool it may be stowed away in casks or carboys, the air to be perfectly excluded, and it will be fit for use at any time with the simple preparation of well stirring it up.

This paint laid on stone, brick, compo, or wood, in the usual manner, will dry in from thirty minutes to two hours according to the density or porosity of the material, so that a day would be more than sufficient time for the 'laying on' and drying of several coats. The colour is a mellow pinkish white; other tints can be communicated to the paint by using various sorts of shell lac, ochre, sienna, etc.: clay colours are the best to be used. Its cost is less than half that of the composition generally employed, it being 30d. per gallon at the most. The mixture should be carefully stirred every time the brush is put into it. This solution renders hydraulic cement, plaster, etc., more durable, if it be employed as the moistening agent.

2. The colour is to be mixed with a solution of glue, about a pound dissolved in a gallon of water, and the house or wall to be painted with the same. When nearly dry it is to be brushed over with a strong infusion of oak or catechu; by this process the gelatine or glue is converted into leather (lannate of gelatine) by the tannic acid, and the colour is thus protected. If the oak bark infusion is applied while the coat of glue and colour is too wet, the result will be a very unequal surface; if too dry, the action of the infusion takes place with difficulty, and the paint is not likely to be durable.

This invention is detailed in the *BUILDER Journal*, 1855, xiii, 466; and some recipes for other paints for outside work, in pp. 432 and 443; brushes for the paint, in p. 492.

LACE. Probably a term for a chamfer, as noticed *s.v.* **FOOTLACING.** The term occurs in the passage "without laces or keys to bind them", in a book dated 1754. "Laces or binding beams", and "purlaces", occur in HOLMES, *Academy of Armory*, fol., Chester, 1688, p. 450, in the enumeration of the "several pieces of timber belonging to a wood house". The *Prompt. Par.* has "lace of a howse-rofe, laquearia". 17.

LACER (CAIUS JULIUS), see JULIUS LACER (CAIUS).

ARCH. PUB. SOC.

LACE WOOD, see PLATANUS.

LACHMUS or **LITMUS BLUE**. This colour is said to be composed of quicklime, urine, and archil. 13.

LACING COURSE. The term applied to the horizontal courses of brick or tile introduced as bonding in flint work. **LAINES.**

LACKER or **LACQUER.** A sort of varnish chiefly composed, as its name imports, of gum *LAC*. In architecture it is chiefly used for coating brass work, as knobs of doors, and other work connected with locks, hat and cloak pins, sash fastenings, water-closet handles and fittings, etc., to prevent oxidation. Pale lacker is made with half a pound of best pale shell lac to a gallon of spirits of wine. It may be tinted yellow by gamboge, turmeric, aloes, or saffron; or red by dragon's blood or arnatto. In superior work the lac or gamboge, or other gums, are first dissolved in pyro-acetic ether, which takes up the pure resins, and throws down the impurities. The best gold-coloured lacker is composed of 8 oz. of shell lac, 2 oz. sandarac, 8 oz. turmeric, ¼ oz. dragon's blood, 2 oz. arnatto, and 1 gall. of spirits of wine. The work should be carefully cleaned with diluted oil of vitriol and rubbed dry, then heated on a muffle furnace at a temperature of about 200° Fahr., which causing the resin to flow and the spirit to evaporate rapidly, renders the work bright and durable. It should be suffered to remain a sufficient time to harden. Metal work so covered must never be cleaned with hot water, though if well done, it will stand the application of cold water. A. A.

LAC LAKE, prepared from the *lac* insect, possesses a rich colour, transparent and deep,—less brilliant and more durable than that of cochineal (*SCARLET LAKE*), but inferior in both these respects to the colours of madder. Used in body or strong glazing, as a shadow colour, it is of great power and much permanence; but in thin glazing it changes and flies, as it does also in tint with white lead. This lake appears to have stood best in old pictures, and was probably obtained by the Venetians from India, whence it is sometimes called Indian lake: FIELD, *Grammar of Colouring*, 12mo., London, 1858.

LACONIAN MARBLE. The ancient quarries affording this marble have been discovered by the French commission two miles south-east of Levctzova. The marble is green porphyry; and though not suitable for Grecian temples, it would be greatly prized by the Romans, who employed extensively variegated sorts of marble for the decoration of their buildings. Hence it is probable that the marble celebrated by the Romans under the name of Laconian is this green porphyry from Croceæ, a village on the road from Sparta to Gythium, and near the latter place; and that it was the quarries of this place which STRABO, viii, 367, says were opened by the Romans at Taygetus. PAVSANIAS describes the marble as difficult to work, but when wrought forming beautiful decorations for temples, baths, and fountains; the most celebrated of the Corinthian baths was adorned with marbles from the quarries at Croceæ. BLOUET, *Description de la Morée* (Géognosie), 4to., Paris, 1833, ii, pt. 2, p. 129; LEAKE, *Peloponnesiaica*, 8vo., London, 1846, p. 170; CURTIUS, *Peloponnesos*, 8vo., Gotha, 1851, ii, 266. 23.

LACONICUM. The sweating bath of the ancients, which VITRUVIUS does not mention as anything separate from the *CALDARIUM* or hot bath: but on this point reference should be made to DION CASSIUS, liii, edit. Reimarus, fol., Hamburg, 1750, p. 721; *Detached Essays*, Baths and Washhouses, p. 4, 6, etc. A. A.

LACOTTE. A quarter of the houses and many of the best hôtels of Bordeaux were built after designs by brothers of this name. One of them was directed to complete, after the death 1774 of Etienne, the old episcopal palace, since 1836 the hôtel-de-ville; and he designed 1826 the two fine public baths in the place; BERNADAU, *Viographie Bordelais*, 8vo., Bordeaux, 1844, p. 131. FÜSSLER, in an extract from the *NOUVELLES DES ARTS*, i, 68, states that about 1801 one of them was, together with

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three of his fellow-citizens, commissioned to devise a monument in honour of Buonaparte, which, however, was never executed.

LACTARIA COLUMNA. This term is described by POMPEIUS FESUS, *sub voce*, as a column in the herb market (*forum olitorium*) at Rome, where infant children were brought to be fed with milk; probably those who had lost their mothers, or whose mothers were unable to supply them with their natural food. PUBLIUS VICTOR, *Reg.*, xi, describes this in almost the same words. GUILT, *Encyc.*, explains 'lactarium' as a dairy house, but this word is not to be found in the Dictionaries, nor in the index to the *Scriptores Rei Rusticæ*. As a secondary meaning, the same work supposes it to be a place where foundling children were fed, but with as little foundation.

A. A.

LACUNAR. This Latin word, derived from *lacus*, is mentioned by VITRUVIUS, ix, 9, as a name for one species of the ancient dial; he says that "the plinthium or lacunar, an example of which is in the circus Flaminius, was invented by Scopas the Syracusan." The term has been supposed to mean a beam by some translators of HORACE, *Carm.*, ii, 18, "non ebur neque aureum" "mea renidet in domo lacunar", although the words "trabes Hymettie" immediately followed, which would permit *lacunar* to mean a flat surface with gilt ornaments between the beams; and although "curva lacunaria ad circinum delumbata", which occurs in VITRUVIUS, vi, 5, is decisive that architecturally the word meant a ceiling. In other Vitruvian passages, as iv, 3, v, 2, vi, 4, 5, 10, vii, 2, the same meaning of ceiling is evident; and *lacunar*, as mentioned *s.v.* CAMERA, seems generally to mean a ceiling that is flat in opposition to *camera* and to *foris*. Ignoring *lacunarium*, QUATREMÈRE DE QUINCY, *Diet. s.v.*, states that *lacunar* means a coffer, saying that it is "cet espace creux, que laissent dans un plafond les solives entre elles en se croissant: qu'on ait, par la suite, pu donner au tout le nom de la partie, et que lacunar ait pu signifier le plafond, c'est ce que quelques antiquaires prétendent, et ce qu'il nous importe assez peu d'examiner." In the same article this author seems to intimate that *laquear* was also applied to the coffer of a ceiling: he says of *laquear*, "il est possible toutefois que provenant du mot laqueus, ce terme, qui a exprimé la même chose, si l'on explique laqueus par filet, réseau, ait été appliqué aux caissons des plafonds ou des voûtes, parce que effectivement ils y produisent à l'œil l'effet d'un réseau."

Some authors have stated the difference between *lacunar* and *laquear* to be that the latter had bands (? minor beams) between the coffers but the former had none. The term *lacunar* has also been applied to the lengths of panelling (in the soffite of the architrave) between the capitals of columns, and also to the coffers (in the soffite of the corona) between mutules, modillions, etc. LAQUEAR.

LACUNARIUM. A term occurring twice in VITRUVIUS, iv, 8, and rendered by GUILT as the "soffite of the corona" in the Doric order: this translator thus followed some of the commentators on his author, although PHILANDER had previously remarked that the term referred to *tigna et intertigna*. It is evident that *lacunarium* must have meant a system of lacunæ or coffers: whence it is now suggested that *lacunar* meant the beams enclosing a coffer, and of course conveyed an idea of the coffer itself; while *laquear* would extremely well express the effect of a bead and reel separating the margins of coffers in a bay of such panels. Whatever may be the technical distinction (if any) between them, it is clear that *lacus* and *lacunaria* and *laquearia* were regarded as synonymous by SERVIUS; and as *lacunaria* forms a plural to *lacunar* and *lacunarium*, modern authors have availed themselves of it in speaking of coffered ceilings, without troubling themselves about the nominative singular, if indeed some of those writers did not suppose that it was one.

"Lacunaria is the term applied by VITRUVIUS to signify the

ornamental ceiling of a building. The Greek word is *φάνωμα*, which comprises the longitudinal and transverse beams crossing each other at equal intervals, the upper surfaces being covered with planks, which form the ceiling underneath. The transverse beam is called *θραύλον*, and the planking *σανίδωμα*." DILETTANTI SOCIETY, *Antiq. of Ionia*, fol., London, 1840, iii, 39. "It is not to be supposed that temples of a considerable span could be covered with lacunaria of stone: the greatest extent between the supports of a ceiling thus constructed, known to us, does not exceed 22 ft. There is, however, every reason to believe that timber was employed for a similar purpose where the span was great, or where economy was consulted. Some temples were embellished with ornamental ceilings below the framework of timber which supported the tiles (PAUSANIAS, v, 20);" WILKINS, *Prolusiones*, 4to., London, 1837, p. 85; who, p. 9, asserts "that the *δομαίον* therefore, (PLUTARCH, *s.v.* temple of Eleusis), is the lacunaria or ceiling formed by beams, crossing each other at right angles, the *ἐς εὐπρεπείαν στέρη* of PAUSANIAS." Referring to the temple to Theseus (now said to be to Mars) at Athens, a note in STUART and REVETT, *Antiq. of Athens*, fol., Lond., 1827, iii, 73, states "a part of the lacunaria of this temple is now in the courtyard of the British Museum, and two of the detached covers to the panels, 10 ins. square and 2½ ins. thick, are within the museum, marked Nos. 243 and 254. The motive of the Greek architects in having the panels of the lacunaria of this and also of other temples, as those of Nemesis at Rhamnus, perforated, and afterwards covered with a detached and movable slab or tile (on which was sunk the inner molding and panel), let into a rebate; when it would seem to have been a preferable construction to have wrought the entire panel in solid marble, is a question not of easy solution. If these coverings to the top of the panels were removable after the completion of the temples, it must have effected the ventilation of the roof." The same work, 1830, iv, contains a plan with the following remarks: "The lacunaria of this temple are in better preservation than those of any other now remaining: the plan of them has not been given by STUART, and is therefore necessary to the completion of this part of the work: LE ROY has indeed given one, but with the usual inaccuracy of which STUART so justly complained." Referring to the Vitruvian dogma that the disposition of the beams of the lacunaria should follow that of the triglyphs, the editor says "we know not how VITRUVIUS could have fallen into this mistake, more especially as he professes to have formed his rules from Grecian models; for in all the examples now remaining, the lacunaria are arranged without regard to the position of the triglyphs." The same volume contains a plate of portions of the coffering, with another showing an appropriation of them, belonging to the temple to Apollo Epicurius at Bassæ: which it will be found instructive to compare with the restoration given in COCKERELL, *Temples*, fol., London, 1860. A fragment of a ceiling shown by INWOOD, which was found not far from the east portico of the temple to Erechtheus, differs much from the details shown in STUART and REVETT; it may have belonged to the east portico or to the interior ceiling. "The coffers in the two other porticoes, having their moldings uncarved and only painted, were recessed up in the solid block, as those of the propylæa of Athens and Eleusis, the temple of Diana Propylæa at Eleusis, and the temple of Apollo near Phigaleia. But in the two instances where the molding of the coffer is carved, the present one and those to the peripteral temple at Rhamnus, the expedient was necessary of having the top of the panel open until the molding was carved, the artist could have scarcely otherwise found it possible to form with a degree of precision the beautiful egg-like ornaments thus sunk in a small panel in the present example; it would appear when the ornaments were finished the top of the panel was then fitted in by tenons of an extended H form." INWOOD, *Erechtheium*, fol., London, 1827, p. 126, pl. 20.

In connection with the ornament of churches, BINGHAM, *Works*, 8vo., Oxford, 1855, iii, 154-5, speaks of beautifying the roof or camera by lacunary work, dividing the roof into several panels, by architects termed *laquearia* or *lacunaria* from *lucus*, some of which were round and some square, as VALESIUS observes out of ISIDORUS, *Origines*, l. 19, c. 12 (p. 165 c), "*Laquearia sunt, quæ cameram subtegunt et ornant*", and divided either with wood or plaster, or colours. Constantine's church at Jerusalem was lacunary, for EUSEBIUS, *De Vit. Constant.*, l. 3, c. 36 (v. i, p. 598. 21), says the whole roof was divided into certain carved tables or panels, and all laid over with shining gold. PAULINUS, *Ep. 12 ad Sever.* (pp. 150-1), says the body of his church and the galleries on both sides were lacunary work.

The waggon-headed ceiling filled with small panels in the church of All Saints at Southampton, designed by W. Reveley about 1793, is a fine modern example of lacunary work.

LACUSTRINE AND PALUSTRINE DWELLINGS.

Modern geologists require the belief that there was a period when the reindeer ranged down to the Alps and the Pyrenees; and with the cave-lion, the bear, the hyæna, and the musk-sheep, was to be extirpated by man who was a savage, able to make a fire but not to apply it to pottery, unaccustomed to cereals, and not master of the dog, but armed with the arrow, the spear, and the sling, as shown by rough flint and chert remains. The musk-sheep has departed from the old world, leaving proofs that it shared the higher latitudes of Asia with the reindeer, which has retreated north during the historic period.

At a somewhat later time, the same animals, with the horse and the ox, were to be driven northwards by a race of such men as those who, living in the caves of Périgord and Aquitaine, could not only cut flint, schist, and bone into harpoons, arrow-heads, needles, and whistles, but could carve the bone handles of knives and of daggers, which are so small as to require only three fingers of the ordinary hand to grasp them. Details of the discovery of this second race are given by LARTET and CHRISTY, *Cavernes du Périgord*, Paris, 1864.

After an unknown interval of time, during which the European climate was modified, the rough-flint folk and the carved-bone folk were succeeded by the polished-stone folk. These occupied dwellings either sunk in the earth (the sites of which are now known as *hut-circles*), or else raised upon piles driven into the shallows of lakes. Universally they used the dog; and lived upon the urus, the red-deer, the horse, the ox, the goat, the sheep, and the pig, slain with ground and polished stone instruments. They were potters and spinners: while the burnt granaries found in the Swiss lakes show that they were agriculturists as well as pastors. It is tolerably clear that this race existed long enough to possess instruments of bronze, and afterwards of iron: but it is not so clear that all ancient lake-dwellings belonged to it; and on this point it will be well to consult the description, which HERODOTUS, v, 16, gives of the piled foundations fixed by the Pæonians in the Prasian lake, as well as the accounts of the stockaded islets, called "crannoges" or little wooden islands, by WATT, *A Few Observations on the Early Habitations of the Irish, and especially the Crannoges or Lake Castles, in Sessional Papers of the Royal Institute of British Architects*, 11 January 1858, pp. 64-5, which condensed the modern notices supplied by WILDE, *Descriptive Catalogue of the Antiquities—in the Museum of the Royal Irish Academy*, 8vo., Dublin, 1857, pp. 221-37: this author, (noting that it is uncertain whether the name was derived from the timber employed in enlarging, securing, and fortifying the island; or from the wooden houses erected on it; or whether also applied to log-houses on the land), seems to do scanty justice to the earliest discovery of such a dwelling in Ireland, which is described by MUDGE, *Description of an Ancient Structure dug out of Drumkelin Bog*, in *ARCHÆOLOGIA*, 4to., London, 1836, xxvi, 361. The *ATHENÆUM Journal*, 1860, p. 714, has a note

on the discoveries during the previous eight years in almost every lake of Switzerland, Denmark, Savoy, and Italy, ignoring British examples; and p. 758, a reply which, omitting to notice the Drumkelin house, cites, besides the *Report on the Crannoges of the Irish Lakes*, by T. J. MULVANY, proofs of the precedence of the Irish archæologists in attention to the subject; upon which WAKEMAN, *Archæologia Hibernica; Handbook of Irish Antiquities*, 16mo., Dublin, 1848; and R. M'ADAM, *General View of the Discoveries in Switzerland and Ireland*, in the *ULSTER JOURNAL OF ARCHÆOLOGY*, July 1859, No. 27, may be also consulted. A notice of two crannoges in the Loch of the Clans at Kilravock in Nairnshire, by John Grigor, M.D., was read at the Society of Antiquaries of Scotland; *BUILDER Journal*, 1863, xxi, 388.

According to the slope of the shore, the lake-dwellings of the polished-stone folk are found so near the bank as 12 to 18 ft.; the remains buried in peat-moors, however, give the best information as to the construction of the pile-work (at Fimon and in Swiss examples the spaces are filled with rubble, whence the name of *steinberg* has been applied to these works), the mode of erection, the size, and the form, of the buildings: in the latter respect the elliptical and the oblong plan are usual (more than thirty elliptically planned huts about 14 ft. 9 ins. long by 11 ft. 6 ins. wide, formed the village of Fimon), although in the lake of Bienné (Bielersee) circular forms were found by TROYON, *Habitations Lacustres des temps anciens et modernes*, 8vo., Lausanne, 1860, which remains the most complete essay upon the subject. This work, with BOUCHER DE PERTHES, *Antiquités Colligées et Antédiluviennes*, 8vo., Paris, 1847-57; and DESOR, *Les Palafittes, ou constructions lacustres du lac de Neuchâtel*, 8vo., Neuchâtel, 1865, should be compared with the essays of KELLER of Zürich, which have been translated and arranged by LEE, *The Lake-Dwellings of Switzerland and other parts of Europe*, London, 1866. Amongst other similar works are:—PIGORINI and STROBEL, *Prima Relazione sulle Terreemure dell' Emilia*, 8vo., Parma, 1862; STROBEL, *Palafitte di Castione: Ricerche Paleontologiche nelle terramare e nelle palafitte del Parmigiano: Avanzi preromani raccolti nell' Emilia*, Parma, 1862-3; PIGORINI, *Sulle Terreemure di Casarulo: Sugli scavi di Travertesolo*, Parma, 1863; STAUB, *Die Phalbauten*, Zürich, 1864; RAUUR, *Les habitations lacustres de Savoie*, Paris, 1864; and LIOX, *Le abitazioni lacustri della età della pietra nel Vicentino*, 8vo., Venice, 1865, in whose pages notice will be found of his discovery in the valley of Fimon about three miles from Vicenza; with useful notes of other essays in various periodicals, and a general view of the subject of this article accompanied by some very dubious etymological suggestions.

The iron age of these erections is connected with the historic period only by the discovery of Gallic and Massilian coins with the remains found in the lake of Tene in Switzerland.

The novelty of the discoveries of an agricultural race's huts having walls formed of twisted branches and bark enclosing floors of hardened earth on stages resting on piles, in almost every Swiss lake, is noted in the *BUILDER Journal*, 1862, xx, 232: but these hutted islands are not fairly to be compared with the in-shore houses of the Dyaks in Western Borneo, of the Malays in Ceram, of the Papuans in New Guinea, and of the Siamese in Bangkok, of the natives of Kamschatka, and of the military colonists in the south eastern marshes of the Russian territory.

LADDER (Gr. *κλίμαξ*; Anglo-Saxon *hlædder*, probably from the Anglo-Saxon *lædan*, to lead or guide; Lat. and It. *scala*; Sp. *escala*; Fr. *échelle*; Ger. *leiter*). One of the earliest contrivances to ascend a tree, wall, tower, etc. Four kinds of ladders are used in building, the *standard*, the *story*, the *quartering*, and the *step*, ladder. The first vary from 20 ft. to 60 ft. in length, and should be thus made. Some thoroughly sound Norway scaffold poles are selected and sawn down the middle: the pieces are laid side by side, weighted to prevent winding,

and suffered to lie till thoroughly seasoned. Two are then selected, and bored at 10 ins. apart from centre to centre, with holes in which the rounds (in old English *rungs*, probably from the Anglo-Saxon *rinnan*, to run, Fr. *échelons*), are fixed. In the Anglo-Saxon period, the parts appear to have been called 'stalks and rences': and 'steys', *temp.* 1538-68, as in SURTEES SOCIETY, *York Fabric Rolls*, 8vo., Durham, 1859, p. 355. These rungs should be of oak (sometimes out of pipe staves, or) generally out of old spokes of carriage wheels, roughly rounded and tapering at each end; they are inserted into the holes, and wedged from the outside. Three or more iron rungs are generally allowed for each ladder. *Story ladders* are made in the same way, but are lighter, and only long enough to reach from one story to another; they are generally used in the well holes before the stairs are fixed. *Quartering ladders* are made of rough pieces of stuff about 3 ins by 3 ins., and the rounds are notched on the sides and nailed. They are very clumsy, and generally used to support the boards on which plasterers stand while at work; but a more carefully made double ladder, having the standard on each side hinged to its opposite support, is much used in large buildings by painters and plasterers. *Step ladders* are of two kinds, one with sides wrought and beaded, the steps wrought and rounded, housed in, and mostly wedged from the outside. The other sort, chiefly used by paper-hangers, has a framed stay hinged to the top of the ladder, the legs being secured from spreading by two pieces of sash-line or by an iron rod with a hook and eye. Short ladders with fixed stays, or with the legs secured as above described, are generally called *steps*; and such a ladder is usually called a "pair of steps".

A. A.

Ladders were formerly made spreading at the bottom, as may occasionally be seen in old mansions.

The "endless ladder", or rather *HOIST* or *LIFT*, was invented by the late J. Spurgin, M.D., who patented it 7 April 1836; in 1853 he stated that he had only received for its use about £20 during the continuance of the patent, and saw it often in successful action subsequently; *BUILDER Journal*, 1853, xi, 232; xxii, 42. In Maryon's "patent dovetailed ladder" (1860) the rounds are made with a shoulder let into the inward side of the ladder about a quarter of an inch, and a smaller hole for the pin of the round is bored through to the outside: the hole is then made to taper inwardly, to allow for the expansion caused by a wedge which is driven into it from the outside. Thus the sides cannot be driven further than the shoulders; and being wedged on the outside, the pins obtain a dovetailed shape that keeps them firmly in their places. New rounds can be put in and the ladder then be as sound as when new. A "telescope ladder", the invention of G. H. Morgan of Hereford, is described in the *BUILDER Journal*, 1862, xx, 863.

LADIES IN SLATING. The slates made of a size between doubles and countesses. They are about 15 or 16 ins. by 8 ins; a thousand (1200) will cover four to five squares, and will average in weight 1½ ton, according to the thickness which the cleavage of the rock will permit them to be split. In exposed situations, ladies' slating on boarding is supposed to be the best covering for a roof.

A. A.

LADIES' MAIDS' ROOM. An apartment required in an establishment of high standing, forming the ordinary work and sitting room for the accommodation of the family ladies' maids and those belonging to the visitors, and probably best placed in the bedroom story, in connection with the servants' corridor, at some convenient point for communication with the main house. A good side table or dresser is occasionally required for clear starching (and closets for dresses, etc.); *KERR, Gentleman's House*, 8vo., London, 1865, p. 232.

LADLE. The name of the utensil used by plumbers for carrying melting lead and solder from the pot to the work; there are three or four sizes, according to the quantity of melted metal required at once; if a small quantity only be wanted to be used, it is melted in a ladle instead of a pot.

LADY CHAPEL. A term of modern application derived from the Roman Catholic phrase "Our Lady," and signifying a chapel dedicated to the Virgin Mary. It is generally an elongation of what is called in England the choir or chancel. Its use seems to have commenced about the twelfth century, previously to which period the monastic orders had obtained the supremacy over the parochial clergy, and as a necessary consequence of the increased number, the choir, or as it is more properly called on the continent the tribune (the *βήμα* of the early Christian churches) was lengthened. At that period, there arose a peculiar veneration for the Holy Virgin, partly religious, and partly what might be called chivalrous, and in the north of Europe the chancel was still further elongated, and a chapel built dedicated to the Virgin. Some particular towns acquired from this dedication a superior degree of sanctity to others, and the monastic revenues were greatly augmented by the bequests and donations of religious devotees; as at Walsingham, in Norfolk; at Allhallows Barking, London; and the chapel of Our Lady of the Pae (or of Pity) adjoining S. Stephen's chapel, Westminster.

Frequently between the reredos screen and the Lady chapel is a considerable space called the presbytery, because it is traditionally said the priests assembled there before the commencement of the different services. There is always a chapel to the Virgin in continental churches, but it seldom occupies the place it does in England.

A. A.

Next to the choir, the lady chapel was the most sacred portion of a church. It was sometimes called the retro-choir, in which sick monks were allowed to attend divine service without entering the choir. It was often the most decorated part of the building, with sculpture, paintings, glass, etc., and held a shrine and an altar, with an image often profusely decorated with jewels and embroidery. "POOLE principally objects to the position of the lady chapel at the east end, above, as he expresses it, the high altar. Now we believe the lady chapel to have occupied that place merely on grounds of convenience; not from any design—which is shocking to imagine—of exalting the Blessed Virgin to any participation in the honours of the Deity;" *DURANDES, Symbolism*, 8vo., Leeds, 1813, lxxxviii.

The lady chapel, together with the range of chapels encircling the high altar, is almost always absent from the churches in the north of Spain, possibly because the entire church is but a lady chapel in this land of ultra-Mariolatry; the *retablo* generally forms the eastern extremity of the building.

The earliest Lady chapel at Canterbury was built at the west end, and re-erected in the north aisle of the nave by Lanfranc (1070-89), but this chapel did not assume a prominent position until the thirteenth century; in Belgium not until the fourteenth century (*SCHAYES, Arch. en Belgique*, 8vo., Brux., 1850-53, iii, 105), and then it was usually placed eastward of the choir.

After the First Pointed Period, the aisles were usually chapels, and were often so called, as in Holy Trinity church at Haddenham, in Cambridgeshire, "and the north isle very frequently constituted the lady chapel. In Third Pointed work, the aisles would appear to have been generally employed as chapels," *Handbook*, 113. The lady chapel was generally placed either at the east end of the church behind the high altar, or in one of the aisles of the choir. Thus in the cathedrals of Salisbury, Exeter, Gloucester, Worcester, Wells, Hereford, Winchester, etc., it is placed at the east end: at those of Peterborough (pulled down in 1651), Canterbury, Oxford, Hereford, Hulne, Belvoir, Llanthony, Wymondham, Glastonbury, Bury St. Edmunds, Walsingham, and Bristol, it is in, or attached to, the north side of the choir; at Ely cathedral it is detached from, or connected at one angle with, the northern extremity of the transept; it was also detached at S. Martin des Champs; whilst at Durham cathedral the galilee, or western porch, is the lady chapel.

It is on the north side of the nave at Waltham abbey, and at Rochester cathedral: on the south side of the choir at Elgin cathedral; at Ripon minster (over the chapter house); and at Kilkenny: in the south transept at Wimborne: at Christchurch in Hampshire there is a chantry over the lady chapel: and it is sometimes placed over the chancel, as in Compton church, Surrey; Compton Martin, Somersetshire; and Darenth, Kent: or over the porch as at Fordham, Cambridgeshire. At Croyland abbey there was a lady chapel on the north side of the choir, and also another in the south transept with a lofty screen; Gough, *Hist. of Croyland Abbey*, 4to., London, 1783, p. 81 and 198. At Lincoln and Gloucester its form is cruciform; at Lichfield and Wells it has a polygonal apse.

LAFORGUE (ANTOINE), was born 1782 at Toulouse in France, and studied architecture there in the special schools of the fine arts. He was employed 1802-17 in the works of the ponts et chaussées, especially on the canal du Languedoc, and was *dessinateur-géographe* under its chief inspector. After assisting the architect of the city of Toulouse in the works of the maison d'arrêt, he was appointed 1818 architect to the préfecture of Toulouse, and 1822 to the département de Haute Garonne. He designed the tribunal de première instance, and the halle-au-blé; and restored the sous-préfecture; all in the town of Muret. He restored the building intended for the tribunal de première instance at Toulouse; and constructed the church at Cierp and at Argut-Dessus, as well as many presbyterial houses; the manufactory of the Saut de Sabot (Tarn); directed the works of the convent and church of the Dames religieuses de la Visitation, at Toulouse; and the supply of water to the fountains; with other engineering operations in that city. The date of his death is not recorded. 68. 110.

LAGARDETTE (CHARLES MICHEL DE), also called DELAGARDETTE, DE LAGARDETTE, and DE LA GARDETTE, obtained 1791 the second prizes for a conservatory, and for a public gallery in a royal palace, both given in *Projets d'Architecture — Grands Prix*, fol., Paris, 1806: and in the same year the prix d'émulation of the academy of architecture for his design for a monument to Mirabeau; this is given in pl. 40 of DETOURNELLE, *Arch. Nouvelle*, 4to., Paris, 1805; which also gives pl. 55-8 the theatre of the école de médecine erected 1749 by him at Marseilles; pl. 42 the hot house erected 1804 in the jardin des plantes in that city; and pl. 79-81 the house erected for a dealer in pictures in the angle formed by the rue des fossées de M. le Prince and rue de Voltaire, probably in the same city. His design for a military monument for the département du Loire et Cher to be erected at Blois, is given in LONDON, *Annales du Musée*, etc., 8vo., Paris, 1802, ii, 45, pl. 23.

During the republic he became a pensionnaire of the école des arts at Rome; and arrived at Pæstum 23 March 1793. The following are his publications; *L'art du Plombier — fontainier* for the *Descriptions des Arts et Métiers*, fol., Paris, 1773; *Règles des cinq ordres d'architecture* (of Vignola); *avec un ordre Dorique de Pæstum*; *Leçons élémentaires des Ombres*, 4to., Paris, 1786; with SIMONIN, *Le Traité élémentaire de la coupe des pierres*, 49 plates, 4to., Paris, 1792; *Essai sur la Restauration des piliers du dôme du Panthéon Français*, 4to., Paris, 1798; *Les Ruines de Pæstum ou de Posidonia*, fol., Paris, 1799; *Nouvelles règles pour la pratique du dessin et du lavis de l'architecture civile et militaire*, 8vo., Paris, 1803. E. H. Godde was his pupil. He died at Paris in 1804. 68. 69.

LAGESTREMA, or Bahai-bya. A wood used in the East Indies for posts in building houses. BAN-BOAY. In Southern India, L. microcarpa is a tree of large size with a long straight stem; the timber is of ordinary character, easily worked, but not suited where strength or beauty is required; it is used for shafts and spokes. BUILDING NEWS Journal, 1856, ii, 919. 71.

LAGGING. The board or plank (one of a series) extending from one frame or rib to another in the construction of the

centering for an arch, to carry the voussoirs or arch stones. CENTRE OF AN ARCH.

LAGHI (ANTONIO), constructed 1726 at Bologna the small church of the Madonna della Grazie or della Porta, which was closed for a long time, but is mentioned (1816) as restored; and 1793 added the staircase to the palazzo Caprara, now (1836) Beauharnois, built by A. Torreggiani. He died in 1756. 105.

LAHORE. The capital of the Punjab, situated in Northern Hindostan. The city is about four miles in circumference, surrounded by a brick wall formerly about 25 ft. in height, but since lowered, with bastions and a broad moat. It was taken in 1523 by sultan Baber and became for a time the favourite seat of the Mogul empire. In 1849 after the final overthrow of the Sikhs it fell into the possession of the British. The streets are very narrow, dirty, and unpaved, with a kennel in the middle; and they are obstructed by the moveable awnings projecting over the shops and occupying nearly the entire breadth of the roadway. The houses are high, built of brick, with flat roofs, and have a mean appearance, sometimes in part redeemed by the elegant carving of the wood balconies and low windows. The bazaars are numerous.

The citadel and palace consists of three large quadrangles; the first is 500 paces long, surrounded by vaulted buildings, and now (1846) used as magazines; the west side is occupied by a mosque, built by Aurungzebe (1658-1707), with a minaret 156 ft. high at each angle, of red sandstone brought from Delhi. The garden court or the Hazari bagh, is also surrounded by vaulted though decayed open halls, with a pavilion of white marble in the centre. The third court or the citadel is surrounded by numerous buildings, among which the winter palace of the maharajah on its north side, with a winding staircase rising above its highest platform, has a very original appearance.

The more remarkable mosques are, that of the Padishah, of red sandstone, of great size, with lofty minarets and cupolas, said to have been founded by Aurungzebe; of Nawaub Wuzur Khan (vizier to Aurungzebe or Jehanjir), having tall minarets and entirely covered with enamelled coloured tiles and inscribed with Arabic sentences; and the Sona or Sonara, or golden mosque, a large structure with gilded minarets and domes. The first two have long since had their lower apartments converted into slaughter-houses and their courts into stables. There are many other fine mosques and Hindoo temples, but mostly in a decaying state.

On the opposite side of the river Ravee or Ravi, about three miles west of the town, is one of the four wonders of Hindostan, as classed by the natives, the Shah Dura or Dhera, or mausoleum of the emperor Jehanjir (1605-28), successor to Akbar, built of red sandstone and marble alternately in all parts, having a profusion of marble mosaic work representing flowers and texts of the Koran. It is 60 paces square with a minaret 70 ft. high at each corner. Adjoining the garden is the caravanserai, which is attached to every grave of an emperor, 800 paces square with an interior court of 400 paces, containing 400 dwellings; an equally large quadrangular court surrounded with a wall 20 ft. high, contains a mosque and dwellings for the priests; near it is the tomb of Nurjehan, the consort of Jehanjir, now in ruins, it having been used as a quarry by the Sikhs, and half the splendour of the temple at Amritsar is due to the marbles plundered from this mausoleum; FEROUSSON, *History of Architecture*, 8vo., London, 1866, ii, 699. Three miles north-east of the city is the garden of Shah Jehan (1627-8), called also the Shalimar, or House of Joy. It is about half a mile long, with three successive terraces, rising above each other, and has four hundred and fifty fountains constantly throwing up water which is received in marble tanks; but these as well as the gay pavilions are much dilapidated; many of the stones having been removed by Runjeet Singh to Amritsar. South of the city, but between it and the river, is another remarkable

building, called the tomb of Anarkalli. Views of the "entrance to Lahore," the tomb of Jehanjir, and others, are given in HARDING, *Recollections of India*, folio, London, 1847; BURNES, *Travels into Bokhara*, 8vo., London, 1839, i, 133-38; MASSON, *Journeys in Balochistan*, etc., 8vo., London, 1842, i, 408-16. THORNTON, *Gazetteer*, 8vo., London, 1858.

LAHURE (.....) was practising at the beginning of this century in Paris. His design for a covered circular theatre for the exhibition of national festivities in the winter season, for which he obtained 1795 the second prize, is given in DETOURNELLE, *Recueil d'Architecture—Grands Prix*, fol., Paris, 1806, pl. 24-6; NOUVELLE des Beaux-Arts, 8vo., Paris, iv, 69; 246. He designed 1820 the marché aux chevaux at Paris, given in GOURLIER, etc., *Choix d'Edifices*, fol., Paris, 1837-44, i, pl. 167-8. The dates of his birth and death are not recorded. 69.

LAICUS. This term occurs in an inscription 1133 indicating that the execution of the repairs and ornamentation of the cathedral at Wurzburg were confided to "Enselmes laycus;" also known by the construction of a remarkable bridge. "Alberon laicus" at Cologne, may also be cited; LENOIR, *Architecture Monastique*, 4to., Paris, 1852, i, 35.

LAINES. A term described 1736 as "courses or ranks laid in the building of walls." LACING COURSE. 4.

LAING (DAVID) F.S.A., born 1774, the son of a city merchant, was articled to Sir J. Soane. About 1810 he was appointed architect and surveyor of buildings to the Board of Customs, and prepared a design, approved May 1812, for a new custom house adjoining westward to the old one (burnt 12 Feb. 1814) in Lower Thames-street, London; the first stone was laid 25 Oct. 1813, and completed in 1817. In consequence of the sinking of one of the piers of the vaults (related by NASH, in *Transactions of the Royal Institute of British Architects*, 1866-67, p. 132), or decay of the beech piles (*s. v. FAGUS*) under the long room in 1825, the original centre of the front to the Thames was pulled down, and the present one designed by Sir R. Smirke erected. The original façade is shown in ACKERMANN, *Repository of Arts*, 8vo., London, 1816, ii, 30; in PAPWORTH, *Select Views*, 8vo., London, 1816, p. 149; and plans etc. in BRITTON and PUGIN, *Public Buildings*, 8vo., London, 1825, i, 46. Laing published *Plans etc. of Buildings, Public and Private, executed in various parts of England, including the Custom House*, 59 plates, fol., London, 1818; the long room was 190 ft. long, 66 ft. wide, and 55 ft. high under the centre of the middle dome. He also published *Hints for Dwellings, consisting of original designs for Cottages, Farm Houses, Villas*, etc., 34 plates, 4to., London, 1800; and issued an *Appeal to the Honourable the Commissioners of H.M. Customs*, 1830.

The above publication comprises, the Custom-house in 41 plates; villa at Lavender-hill, Wandsworth; design for villa at Guernsey for Mr. Macculloch; mansion and offices at Brunswick, Lower Saxony, for J. Retburgh, esq.; house in Ireland for general Taylor; villa at Coley-park, near Reading, for John McConnell, esq.; villa in Jersey, for J. Emery, esq.; design of a house at Dedham in Essex, for Stephen Teissier, esq., which was not carried out, but an old building altered for him; house with farm buildings at Abbott's Langley in Hertfordshire, for Griffith Jones, esq.; a design for a villa in South Devon, for a lady; and the rebuilding of the body of the church of S. Dunstan in the East, the first stone of which was laid 26 Nov. 1817 (this work, however, was designed by his pupil W. Tite; *BUILDER Journal*, xiv, 189); the tower and spire erected 1698 are the work of Sir C. Wren. He also designed 1823-4, the royal universal infirmary for children, in the Waterloo-road, London. Soon after the failure at the Custom-house, Laing retired from public life, and died in Brompton, 27 March 1856, aged 82 years. Among his pupils were; R. Kelsey, the late surveyor of sewers of the city of London; the late T. Lee; C. Fowler; W. Tite, M.P.; and T. Bellamy. *BUILDER Journal*, xiv, 189.

LAIR, for cattle, see LAYER.

LAITH or LEATH. A term used in the West Riding of Yorkshire for a barn.

LAITON, see LATTEN.

LAKE. A name, derived from the *lac* of India, given to a variety of transparent red and other pigments, obtained for the most part by precipitating tinctures of dyeing drugs upon alumine and other earths, etc. The colouring matter of common lake is Brazil wood, which affords a very fugitive colour. Superior red lakes are prepared from cochineal, lac, and kermes; but the best of all from the root of the *Rubia tinctoria* or madder plant. RUBRIC or MADDER LAKE; SCARLET LAKE; LAC LAKE; CARMINE; MADDER CARMINE; ROSE PINK; CHINESE LAKE; FLORENTINE LAKE; GREEN LAKE; PURPLE LAKE; ROMAN LAKE; VENETIAN LAKE; YELLOW LAKE; BLACK LAKE; and ITALIAN PINK. There are also reds called Hamburg lake, and Kermes lake.

LAKRATES and his brother Hermo were sons of Pyrrhus, whom they assisted in building the treasury of the Epidamnians at Olympia, at a period which PAUSANIAS, vi, 19, does not indicate.

LAOS (JACQUES), born in the département du Calvados, practised at the beginning of the nineteenth century at Paris, in which city he constructed many buildings; comprising the house in an Egyptian style in the *place du Caire*, and another in the Gothic style in the rue S. Martin. He made also plans and designs for many parks and gardens in France and near Paris; and published *De la composition des Parcs et Jardins Pittoresques*, 8vo., Paris, 1832, 5th edit. 68, 110.

LALYE (MICHEL), sometimes written LABYE, succeeded 5 Nov. 1532 M. Chambiches at the cathedral at Beauvais, at the yearly wages of 120 francs, 1 franc per day, and two chapter rations (?), where he built the walls of the transept, as detailed *s. v.* Beauvais. He finished 1548 the south *portail de S. Pierre*, with J. Vaast the younger and François Maréchal, *archicharpentier*; WOILLEZ, *Description*, fol., Paris, 1838, p. 6.

LALYS, "was brought from the land of Canaan, being eminent in the art of masonry", by Richard de Granville about 1111, and built for him the castle of Neath in Glamorganshire. "He constructed the most celebrated monasteries, castles, and churches in the country. He obtained lands in Llangenydd, and built Lalyston (Trev Lalys) and removed the church to that place; he then went to London, and became architect to king Henry I; and he taught the art to many of the Welsh and English"; THE MYVRIAN ARCHEOLOGY. GIRALDUS, *Itinerary*, edit. by HOARE, 4to., London, 1806, i, 162; FRANCIS, *Original Charters, etc., of Neath and its Abbey*, 8vo., Swansea, 1845; reviewed with a plan in *ARCHÆOLOGICAL JOURNAL*, 8vo., London, 1846, iii, 227.

LAMBARD (CARLO), was born about 1559 at Arezzo. He practised at Rome, where he rearranged for the Vitelli family a small villa now belonging to the Aldobrandini (or Pamphili as often stated), facing the church of SS. Domenico e Sisto, on Monte Magnanopoli. He designed the façade and the Doric portico to the church of Sta. Francesca Vedova Romana in the Campo Vaccino, and restored the church and the small chapels: rebuilt the palazzo Patrizi, now Costanti, on the *piazza Mattei*, and made many embellishments in it. For the cardinal Benedetto Giustiniani, outside the porta del Popolo, he designed the garden gateway, and some interior works, of which only this entrance with its Ionic columns now remains; and for the same cardinal repaired the church of Sta. Prisca on the Aventine. He made many improvements to the palazzo in the Campo Marzio for the cardinal Carlo Conti: built many houses near the church of Sta. Maria in Via near the piazza di Poli, as appears from the inscriptions still existing; and built in that church the last chapel on the right hand dedicated to the Holy Trinity. He published a pamphlet on the means of preventing the inundations of the Tiber, 1601.

He died in 1620 aged 61 years, and was buried in the above mentioned church of Sta. Maria in Via. 3. 38.

LAMBARDUS. A term occurring in a document 1175 attached to a name, and either designating a country (? Lombardus) or a trade, as described *s.v.* **RAYMUNDUS**.

LAMBERT (LE MARQUIS PIERRE DE), *controleur des bâtiments du roi*, was elected 1699 a member of the academy of architecture, and 26 August 1702 honorary member of the academy of sculpture and painting at Paris. He directed with Dorbay the construction of the collège Mazarin, or des quatre nations, now the Institut de France at Paris designed 1662-70 by Leveau for cardinal Mazarin (AICARD, *Patria*, 8vo., Paris, 1847, p. 2176); and gave the designs for an hôtel in the rue de l'université, opposite the hôtel d'Aiguillon. He died 10 March 1709, aged 63 years. 5. 69.

LAMBERTI (NICOLÒ DI PIERO), usually called Nicolo di Arezzo, from his native town Arezzo, where he was born 1350. He studied sculpture under Moccio, and went to Florence; but returning in 1383 he designed the façade in grey stone for the confraternity of Sta. Maria della Misericordia, which had been commenced in the Gothic style; he was aided by numerous stone cutters from Settignano; the façade with its statues is still (1850) in good condition. He designed the new walls of Borgo San Sepolcro. Pope Boniface IX (1389-1404) invited him to Rome as the most distinguished architect of his time, for the purpose of strengthening the castle of S. Angelo and giving it a better form. He returned to Florence, and thence proceeded to Milan, where he became inspector of the works in the cathedral, according to VASARI, but CIOGNARA, i, 402, doubts his having executed any sculptures there, although BALDINUCCI affirms he did so; the authors on the structure do not name him, except FRANCHETTI, *Storia*, etc., 4to., Milan, 1821, who places him under the date "circa 1411"; the archives preserve memorials of a Nicolo Selli of Arezzo, who was in the service of G. G. Visconti when erecting the certosa of Pavia, and who may be the same person. Whilst returning to Arezzo he erected at Bologna the tomb to pope Alexander V (who died there in 1410), which is placed behind the choir in the church of the Friars Minors: Nicolo died in that city in 1417, aged 66 years, and was buried in the same church. GAYE, *Carteggio*, 8vo., Firenze, 1839, i, 82, et seq., gives a letter from the Signoria of Florence to the doge Michele Steno, dated 8 June 1403, wherein it appears that the Venetian republic had sought the services of Nicolo di Lamberti for the construction of a hall in the ducal palace, but that being engaged to the guild of notaries and on works for the cathedral, the government was not able to lend him to the Venetians. 73.

LAMBERT'S BLUE. The common name used about 1785 by painters for a bright AZURE blue pigment.

LAMBERT'S EQUILIBRIUM BALL VALVE. An improved valve for shutting off the supply of water to a cistern; the end of the lever acting upon the top of a vertical valve pushes it down as the ball descends with drawing off the water and permits it to enter the cistern, again rising as the cistern fills: it cannot become fixed or set fast: the pressure is so nicely balanced that a much shorter lever and smaller ball is used than with the ordinary ball-cock. It is figured in *ARCHITECT Journal*, 1850, ii, 202, together with Lambert's self-acting water closet. Probably the valve was suggested by Lambert's hydrant, figured in *CIVIL ENGINEER Journal*, 1849, xii, 155.

LAMBERTUS DE KENLA, see **KENLA (L. DE)**.

LAMBERTUS MARMORARIUS, 1183, had in Stanhope, in Durham, thirty acres for his service so long as he was in the bishop's service, and when he left he was to render two bezants, or 4s. He doubtless provided the columns of Frosterley marble which bishop Pudsey placed in the galilee of Durham cathedral; **SURTEES SOCIETY**, *Boldon Duke*, etc., 8vo., Durham, 1852, p. 30, 65.

LAMBHETH or **LAMBHITH (WILLIAM DE)** was appointed
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clerk or surveyor of the works at the palace of Westminster and the tower of London, 30th Edward III, 1356, succeeding to T. de Stapelford, and was succeeded by W. de Sleaford in the 35th year, 1361; Cal. Rot. Patent, p. 166, m. 20; ante p. 149; and p. 174, m. 20; as given in BRAYLEY and BRITTON, *Palace*, etc., 8vo., London, 1836, p. 149, 245.

LAMBOURDE. The French name for a soft stone, of a yellowish white colour, which is one of the five sorts of stone found in the quarries near Paris: the best quality is obtained at S. Maur. There are six beds of it averaging 6 to 12 ft. thick, and chiefly consisting of fragments of broken shells, whence it is also called 'pile marin'. The rubble used in the foundations and common masonry at Paris is for the most part composed of pieces or blocks of lambourde: BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, 12.

LAMBREQUIN. A term which, as signifying in the singular the point of a label, and in the plural the mantling placed upon a helmet (although perhaps it properly applies only to the ragged ends or points of such mantling) has been adopted from the French language in English heraldry: being untranslatable, it may be adopted in England rather than the military word 'curtain' as an architectural term for each point of leadwork that hangs as an apron on each side of the ridge of a roof. It occurs in DELAQUÈRIÈRE, *Essai sur les Girouettes, épis*, etc., 8vo., Paris, 1846, p. 40, who observes that "enfin, pour dernier complément de l'ornementation des combles, on découpait en manière des franges les bords extérieurs du plomb des faites qui était appliqué sur l'ardoise de la couverture: ces découpures simulaient ainsi, en quelque sorte, une courtine ou des lambrequins." The use of such decoration is seen in the earliest period of the *style de la Renaissance* at the château de Meillant, as shown in the *Illustrations*, 1851-2, pl. lxxxi, s. v. Ridge, fig. 9; and analogous ornamental work occurs in the leadwork of the roofs of the buildings erected for Louis XIII (1610-43) on the side of the cour de marbre at Versailles. Another example in the same *Illustrations*, fig. 3, occurs on a house built about 1680, and numbered 63 in the faubourg d'Eauplet at Rouen. These are both taken from the work above cited, which mentions two examples in the same city similar to that last noticed; viz. one upon a house No. 36 rue d'Elbeuf, built in the latter half of the seventeenth century; the other upon a pavilion appearing to date in the minority (1643-51) of Louis XIV at No. 57 and 57 bis in the rue du Renard, at the corner of the rue des Grosses Pierres.

LAMBRIZ, see **LAMBRUSCATURA**.

LAMBRUSCATURA. A term used in the Mediæval period, and presumed to signify the lining of wood, to the walls of a room, now known as wainscotwork. It is supposed to be derived from the Fr. *lambris*, meaning an internal lining of marble, wood, or other material; but that only in its modern sense. "Lambriz, wainscot or seeling worke", is so noted in JUNIUS, *Nomenclator*, 12mo., London, 1535. Lambruscare, according to DU CANGE, is translated "to plaster". On the Liberate Roll, 26 Henry III, m. 4, is an order to pay William Beufiz 51s. 6d. "pro lambriscura quam fieri fecit in camera navis nostre in qua transfretavimus." The method of adding comfort to the rooms inhabited by the higher classes by a wood lining, came into use during the thirteenth century, the walls being only plastered before that period; TURNER and PARKER, *Domestic Architecture*, 8vo., London, 1851, i, 85. 26.

LAMB'S TONGUE. A molding of the accompanying section.



LAMB'S TONGUE SASH. One whose bars are molded as in the above section.

LAMEGO (the ancient Lama and Lameca). A town near Porto, in the province of Beira-Alta, in Portugal. It is walled, and defended by an old castle of no interest; this now very dirty town was once the residence of the Moorish kings, until taken from them 1308 by Ferdinand the Great of Castile. It is stated to have been the place of session of the famous cortes,

1143 or 1144, summoned for the first time by king Affonso Henriquez, whose father count Henry founded the cathedral, dedicated to the Assumption, rebuilt in the last century with the exception of the west front, which dates in the middle of the fourteenth century: RACZYNSKI, *Les Arts en Portugal*, 8vo., Paris, 1846, p. 378, supposes the building to date 1385-1435 or a little earlier, and states that the portal is of the time of Henriquez. The tower on the south side of the south aisle is massy Romanesque; the cloisters are to the north. A church called Sta. Maria d'Almacave, originally a mosque, has been entirely modernized; it is said to have been the cathedral of Idacius, who with Ithacius persecuted the Priscillianists. Among the other public buildings are the large and elegant (Italian) episcopal palace; the college with its church; the diocesan seminary; three monasteries; a nunnery; and two hospitals. A very ancient bath at the back of one of the houses in the rua do Castello deserves examination. The monastery of S. Juan de Carouca, situate about six miles distant, had a church built 1122-33 by Froilaco, of which the doorway only was existing at the end of the last century. The church of Sta. Maria de Tarquere near Lamego, is said to have been founded by king Henriquez.

14. 28. 50.
LAMINA. A thin plate or table, a series of which may constitute any substance. The term 'laminated' is used to describe the structure of many clay and sandstones, with some limestones, the lamination being due to their sedimentary origin.

LAMINATED RIB AND BUILT RIB. Names for curved work, given alike to the method of placing short planks of timber set on edge, side by side, and breaking joint, to the intended form of the arch, bolted together, and the under side cut to the requisite curve; as well as to that of placing planks over one another, then bending them to the required form and bolting them together. This last having been explained *s. v.* BENT TIMBER (*BUILDER Journal* for 1849 *passim*), the present article will notice only the first description of rib.

The principle of parallel planks was first developed by P. DE LORME, *Nouvelles inventions pour bien bastir et à petits fraiz*, fol., Paris, 1561, who gives a mode of constructing domes without horizontal cross ties, when the springing of each rib is well secured at the foot. In ribs for small spans, such as 24 to 30 ft., the inch plank is about 4 ft. long by its usual width of 9 ins.; for 36 ft. diameter, 10 ins. deep and $1\frac{1}{2}$ ins. thick; for 39 ft. diam., $11\frac{1}{2}$ ins. deep and $1\frac{3}{4}$ ins. thick; for 60 ft. diam., 13 ins. deep and 2 ins. thick; for 65 ft. diam., $13\frac{1}{2}$ ins. deep and 2 $\frac{1}{2}$ ins. thick; for 90 ft. diam., 13 ins. deep and 2 $\frac{1}{2}$ ins. thick; 108 ft. diam., 13 ins. deep and 3 ins. thick; and 118 ft. diam., $14\frac{1}{2}$ ins. deep and 3 $\frac{1}{2}$ ins. thick. The feet of the ribs are tenoned into the wall plates, the shoulders of

the wall plates, c, 10 or 12 ins. wide and 8 or 9 ins. thick, have mortices 2 ins. wide, 3 ins. deep, and 6 ins. long, sunk at 2 ft. apart to receive the ends of the ribs. In a roof with a span of 64 ft. the scantling is increased to 13 ins. wide and $1\frac{1}{2}$ ins. thick. The ties, alternately double and single, are 3 ins. by $1\frac{1}{2}$ ins., and each rib double tenoned into the wall plate. VIRLOV, *Diet.*, 1771, pl. 49.

DE LORME first employed this mode of construction in the roofs of the pavilions of the château de la Muette at S. Germain-en-Laye; as the walls being in a defective state would not bear either stone vaulting or heavy carpentry. He considered the saving in expense on all points to be very great; and exhibited the application of the principle in several arrangements: NEWLAND, *Carpenter, etc., Assistant*, fol., London, 1860, pl. 30. The church of Sta. Maria della Salute at Venice, completed about 1656 by B. Longhena, is surmounted by a dome 70 ft. diameter, composed of ninety-six ribs, each of four thicknesses pinned together, each rib being $8\frac{1}{2}$ ins. by $5\frac{1}{2}$ ins., all stepped into a circular curb, and all pitching against another curb at the head; the whole is strengthened by an iron hoop $4\frac{1}{2}$ ins. wide and $\frac{3}{4}$ in. thick, and boarded for lead; WARR, *Dynamics*, 8vo., London, 1851, p. 134; *BUILDER Journal*, 1858, xvi, 729; RAYMOND, in *Mémoires de l'Institut, Lit. et Beaux Arts*, iii, p. 395, compares this dome with that of the Invalides at Paris by Mansard. Over the halle-au-blé or corn market at Paris, a dome 200 ft. in diameter, with similarly built ribs, was erected by Legrand, and by Moulineau or Molinos as master carpenter; the ribs were of three planks, with an occasional rib of four planks, each 13 ins. wide and 3 ins. thick, bolted together; one of 3 ft. in length was placed between two others of 6 and 9 ft. in length, connected at distances by pur-lins and iron straps. At one-third the height of the dome every third rib was discontinued; and at two-thirds of the height every second rib; the remaining ribs finally fitting in a ring of timber, above which was placed a capping to provide for ventilation. This noble dome having been destroyed by fire about 1800, was replaced by a smaller one of an iron construction; WARR, in the *ARCHÆOLOGIA*, 1814, xvii, p. 57; KRAFFT, *Charpente*, fol., Paris, 1805, pt. 2, pl. 71 and 72, gives details of these wood roofs, the former drawn by Rondelet. In a roof over the polytechnic institution at Vienna by Stummer, given in the *ALLGEMEINE BAUZEITUNG*, 1839, pl. 305, and copied into the *CIVIL ENGINEER Journal*, 1841, p. 414, the span is 56 ft., the versed sine 18 ft. 6 ins.; the ribs, 12 ft. apart, are 12 ins. deep formed of three timber flitches in 4 ft. lengths, each 2 ins. thick, placed side by side and breaking joint.

This system, with many useful modifications, was extensively adopted in the construction of the nave and side erections of the building for the London International Exhibition of 1862; and also for some of the entrance passages, etc., to the Horticultural Society, London, where they exist, and deserve examination. It has also been adopted for temporary sheds of large spans, such as Volunteer drill sheds.

Drill shed, South Kensington. Capt. Fowke, R.E., said to have cost £82:

BUILDING News Journal, 1861, vii, 49.

Drill shed, Birkenhead, *BUILDER Journal*, xx, 49.

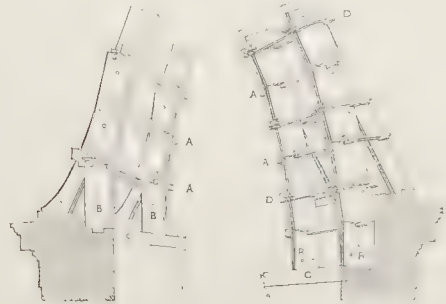
Nave of the International Exhibition Building for 1862, *BUILDING News Journal*, vii, 273.

Annexe machinery shed of ditto, B. N., viii, 270.

" A large view, *ILLUSTRATED LONDON News Journal*, 1862, xl, 356.

A built rib of this sort, properly constructed, is nearly as strong as a solid rib of the same depth and of a breadth less by the thickness of one layer; RANKINE, *Manual of Civil Engineering*, 8vo., London, 1864, p. 465.

LAMINATED BEAM. The name given to a compound beam by J. MARTIN, the painter, in a paper on *A Mode of Adding to the Strength of Timbers*, read at the Royal Institute of British Architects, 10 July 1837. This system is now commonly designated the 'flitch beam', or the 'sandwich beam' of FAIRBAIRN, *Application of Cast and Wrought Iron*, 8vo.,



the tenons being about one inch. The ties A, 4 ins. by 1 in., are placed about 2 ft. distant, they sometimes pass through the planks pinned with keys 1 in. thick and $1\frac{1}{2}$ ins. wide, and of a length nearly the width of the plank, a method tending materially to weaken the ribs; or they are secured at the edges at

London, 1857-8, p. 234, who, however, does not commend the application of the principle which, as detailed by Martin, consisted of the introduction of a thin plate or plates of wrought (now rolled iron) between two thicknesses of timber. His experiment on a beam of American pine 3 ft. long, 1½ ins. deep, and ¾ in. thick, showed a deflection of 16-60ths of an inch with a weight of 84 lbs.; whereas another beam of the same dimensions, with a wrought iron plate in the centre, bore 196 lbs. with the same deflection. FLITCH GIRDER.

LAMOTTE (. . . DE) (probably Vallin de la Mothe), a Frenchman in the service of the czarina (1769), designed 1765 the Petit Ermitage palace at S. Petersburg, having nine windows in the façade (other portions by Feltern 1775 and Quarenghi); GRANVILLE, *Guide*, 8vo., London, 1835, i, 520; SVININ, *Descr.*, 4to., S. Petersburg, 1816-28, iv, 13. PATTE, *Mémoires*, 4to., Paris, 1769, p. 304, gives pl. xvi the method of forming large architraves (*platebandes*) of brickwork, in Russia, devised by Lamotte.

LAMMESHaupt (Meister HEINRICH) was engaged 1360 by duke Wenceslaus I. to finish the *dom* at Liegnitz in Silesia; FIORILLO, *Geschichte*, 8vo., Hannover, 1815, i, 161. 92.

LAMOUREUX (FRANÇOIS) was on 1 Oct. 1583 the "maître des ouvrages de maçonnerie du roi en ce ville de Poitiers"; COMITÉ HISTORIQUE, *Bulletin*, 8vo., Paris, 1842-3, ii, 465.

LAMP BLACK. A kind of fine charcoal prepared from the imperfect combustion of certain sorts of fir containing much resin, and the refuse and residuary resin left by the distillation of turpentine: this is sometimes called 'blue black'. The purest LAMP BLACK is the soot of oil lamps, procured by the combustion of oils, to which gum water is added, but it is much too expensive for common use. The *nero di foglio* of the Italians is prepared from the smoke of burnt paper. Lamp black is extensively employed as a black colour, and mixed with other pigments, which it tends to injure: it appears to be the colouring basis of INDIAN INK. It is owing to the presence of naphthaline, pyretine (a resin), charcoal, and other substances, that lamp black burns with a flame when it is heated, and is therefore subject to spontaneous combustion. 14.

Lamp black neither acts nor is acted upon by the oil with which it is combined. The remarkable durability of a single coat of lamp black and oil is sufficiently proved by the face of almost any old sign-board, or direction post, on which the white lead where exposed has decayed, but is preserved where under the black. Cheap blacks are made of metallic oxides or sulphurets, and are worthless; lamp black, on account of its fine texture, goes furthest and is also in other respects preferable: BUILDER *Journal*, 1858, xvi, 15.

LAMP ROOM. Where oil lamps have to be used, as in country houses, it becomes necessary to provide, near the kitchen, servants' hall, or butler's pantry, according to the scale of the establishment, a room for trimming lamps, and for depositing them during the day. It should contain a *table* or *dresser*, *shelves*, and perhaps a *cupboard*, or an inner closet to receive the oil cans and the more valuable lamps; a small fireplace may also be necessary to prevent the oil freezing in winter. In smaller houses, candlesticks pertain to the housemaid's closet; and it is not uncommon to combine that room with the lamp room, or to make the latter an inner closet to the former: KERR, *Gentleman's House*, 8vo., London, 1865, 2nd edit., p. 234.

The rags after use, and also any sawdust saturated with oil, should be carefully burnt, for when they are laid aside or thrown into the dust-bin, as is often done, spontaneous combustion is promoted, and the probable destruction of the building by fire ensues: the London Fire Brigade lately (May 1867) returned four cases of this description in one morning's report.

LAMUS, in Cilicia, see ILLAMUS.

LANA. The ancient name of the GENIPA Americana.

LANARIÆ. The nominative plural of a Latin substantive which, as found in an inscription (?a forgery), given in CAPACCIO,

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Hist. Neap., 4to., Naples, 1771, ii, 316-7, may have meant either storehouses for wool, cloth manufactories, or even fulling establishments.

LANCEA. The term indifferently applied with *virga* and *flèche*, to a kind of pillar made of purbeck marble, and used probably to surmount the cross at Northampton; WILLIS, *Nomenclature*, 4to., Cambridge, 1844, p. 41.

LANCET ARCH (Fr. *lancette*, a small arrow or dart). A name given generally to the arches of the First Pointed or Early English period at the beginning of the thirteenth century. It is now, however, considered more correct to call the usual form, as at A, an equilateral arch; and that at B, where the centres are outside the springing, a lancet arch.

When the centres are within the opening of the window, as at C, such arches are now generally styled *depressed* arches. The arches of the naves at Wells and Lincoln are examples of the first description; at Westminster abbey of the second; and at Salisbury of the third.

The term 'horseshoe lancet arch' seems exactly to translate "l'arc ogival aigu se terminant par encorbellement sur l'imposte", which GIRAULT DE PRANGEY, *Archit. Arabe*, 8vo., Paris, 1841, p. 76, says is worth notice as occurring in some ruins on the banks of the Guadalquivir near the bridge of Cordova, because he assumes them to be the remains of the palace of the governor of that city during the reign of Abou-Yacoub (1164-84).

Passing as uncommon the pointed horseshoe or stilted arches in the choir at Canterbury, it should be mentioned that the openings belonging to First Pointed work were by no means always lancet shaped; and that, not only on the continent, but in England, lancet arches were used in buildings of much later date; in support of the latter observation, Perpendicular work in the church of S. Edward at Cambridge may be cited.

LANCET ARCH GOTHIC. A term used by DALLAWAY for the EARLY ENGLISH period of Pointed architecture. The "Lancet Period" in SHARPE, *The Seven Periods of English Architecture*, 8vo., London, 1851, partly gave rise to a controversy in the BUILDER *Journal*, 1851, ix, 356, 386, 417, 430, 445, 463, 480, 512.

LANCE WOOD, see GUATTERIA. The *Euonymus Europa* also so called, only furnishes wood for skewers: this tree is also called the Spindle tree, and supplies in France the wood for bobbins and common carpenters' rules. It is softer than boxwood, but of a yellow colour. Its charcoal is very easily effaced. *Duguetia quitarensis*, lance wood, well known for its great strength and elasticity, is imported from Cuba and Guiana, where it is called *yarri-yarri*, in poles from 15 to 20 ft. in length, and from 6 to 7 ins. in diameter, covered with a thin wrinkled bark: ARCHER, *Popular Econ. Botany*, 8vo., London, 1853, p. 337. 71.

LANCHENU (JEAN FRANÇOIS), born at Paris, designed 1702 the small portico of four Ionic columns to the old parish church of S. Pierre des Arcis at Paris. He appears to have studied in Italy, according to BRICE, *Nouv. descr. de Paris*, 12mo., Paris, 1725. 5.

LANCIANO (representing the ancient *Anzanum*). A town in the province of Abruzzo Citra, in southern Italy. It is the see of an archbishop; the cathedral, dedicated to Sta. Maria del Ponte, is built on a remarkable bridge referred to the third century, called the 'bridge of Diocletian', which connects two of the three hills on which the town is built. The church of Sta. Maria Maggiore has a fine Gothic façade with two superb wheel windows: there are several other churches. 28. 50.

LAND, see COMPENSATION; COMPULSORY SALE; COPYHOLD; INCLOSURE COMMISSION; RENT; TILLAGE; VALUE; LOW, *On Landed Property and the Economy of Estates*, 8vo., London, 1856. A. A.

LANDFRIDUS lived in the latter part of the eleventh century, as ORDERICUS VITALIS, *Hist. Eccles.*, edit. MIGNE, *Patrologia*, 8vo., Paris, 1855, pars 3, l. viii, p. 628 (Bohn's translation, 8vo., Lond., 1853-6, iii, 25) states *s. a.* 1094 "it is said that Albereda (wife of Ralph count of Bayeux) having built this fortress (of Ivry in Normandy) with vast labour and expense, caused Lanfred, whose character as an architect transcended that of all the other French architects at that time (Landfredum architectum, cujus ingenii laus super omnes artifices, qui tunc in Gallia erant, transcenderat), and who, after building the castle of Pithiviers (about 1190, ? 1090), was appointed master of these works (magister hujus operis), to be beheaded, that he might not erect a similar fortress anywhere else."

LANDING. That plane, other than the ground, surface on which a person "lands" after ascending or descending a flight of steps. It often occurs where a turn is made, intended as a resting place before ascending the remainder of the flight. If the landing extends to both flights, as at A, it is called a half space; if only to one flight, as at B, a quarter space; and C is called a quarter space of winders. Old writers use the word 'pace' for the present 'space'. The boards forming landings should be glued up, and supported by proper



carriages. APRON PIECE. A. A.

LANDING As half spaces, quarter spaces, and whole spaces or landings, of stone staircases require the use of flat stones of larger dimensions than are ordinarily used for paving purposes, the term "landing" has been applied to such stones or to others of similar large dimensions. The denomination "landing" is properly used when the stone contains a superficial area exceeding 15 ft. to whatever purpose it may be applied; and when the area exceeds 30 ft., or the length or width exceeds 6 ft., the value per foot superficial is considerably increased. Landings may be 3, 4, 5, 6, 7, or more inches in thickness; and when used to staircases, galleries, or balconies, tailing into the wall at one end only, the joints between the adjacent stones should invariably be formed by a solid "he and she" joggle, so that each stone may afford support to those adjoining. Where, however, the landing is supported at each end in a wall, and a sound close joint without regard to strength is only required, the joint may be plain with a groove worked in each face, to be run in with cement or with lead: but a continuous support to the joint is desirable, in case the stone should crack across. JOGGLE.

Where the landing is connected with the last or topmost step of a flight, such step and the landing should be worked out of a stone of sufficient thickness to contain the entire riser, and its rebate; the soffit of the landing portion of the stone being sunk out to the same thickness as the remainder of the landing. For balcony or gallery landings, where the stone is tailed in on the back edge only, the soundness and strength of the stone used requires especial consideration on account of the great strain at the point of juncture with the wall. *Slate* is well adapted for, and is frequently used as, landings in large slabs; but some qualities contain "hair cracks," which render caution indispensable in their application. A. C.

Landings have been supplied of very large sizes; one from the Idle quarry near Leeds, 13 ft. 4 ins. long, 7 ft. wide, and 4 ins. thick, was sent to the Exhibition of 1862.

LANDING PLACE (Fr. *palier d'escalier*). "The uppermost step of a pair of stairs, viz., the floor of the room you ascend upon;" MOXON, *Mech. Exercises* (Carpentry) 4to., London, 1694, p. 165.

LANDLORD AND TENANT. The consideration of the legal relative position of him who lets a property, and of him who rents it, is beyond the province of this work; but besides the chief questions to the architect, of breach of covenants of a lease (FIXTURES) and of DILAPIDATIONS at its expiration, the

following works should be consulted. WOODFALL, *Law of Landlord and Tenant*, 9th edit., by Cole, 8vo., Lond., 1867; SMITH (J. W.), *Law of Landlord and Tenant*, 8vo., Lond., 1860; COX, *Landlord and Tenant's Guide*, 8vo., Lond., 1853; LYON, *Compendium of the Law of Landlord and Tenant, as applicable both to Agricultural Leases and to those of Urban Tenements*, 8vo., Edinburgh, 1848; LORD ST. LEONARD'S *Handy Book on Property Law*, 7th edit., 8vo., London, 1866; HOLLDSWORTH, *Law of Landlord and Tenant, with Useful Forms*, 8vo., London, 1857.

LANDMARK. A post or other mark fixed into the ground to mark the boundary between two neighbouring lands. Stone is much used as being very durable; and lately cast iron has also been adopted for this purpose. A. A.

LANDMARK. Some conspicuous erection placed on land, by the bearings of which ships may steer and avoid shoals, sands, rocks, etc., at sea. Very frequently the steeples of churches are used for this purpose, one of the best known examples of which are the towers at Reculver in Kent. Now that lighthouses and similar constructions are confided almost exclusively to engineers, the architect is seldom called on to design a landmark. Should he, however, have such a commission, it is necessary to remember that it is essential that every such erection should be as unlike as possible to any other in proximity to it. Church towers and spires have been often mistaken for one another in thick weather. The Isle of Thanet offers a good example of landmarks. The Reculver has two towers with spires; on Monkton Level there is a large obelisk; near Margate is a column with bands and a ball at the top; and near this, by Fore Ness, a high square brick tower. Landmarks differ from lighthouses only in shewing no light at night. LANTERN; LIGHTHOUSE; PHAROS. A. A.

LAND MEASURE. The linear measures are the inch, foot, yard, pole, furlong, and mile. The measures of superficies are the square inch, foot, yard, pole, rood, and acre; very large surfaces, as of countries, are expressed in miles. The usual tables are given in most works on arithmetic; and each name is explained in this work. MEASURE. WEIR, *Land Measuring Tables, showing the area of any sized plots*, 8vo., Glasgow, 1857; RYDE and DONALDSON, *General Textbook*, 8vo., London, 1854; McCULLOCH, *Land Measurer's Ready Reckoner—for contents of pieces of Land*.

LANDO (MAESTRO . . .) see MACARTO (L. DI).

LAND OWNER. A word lately used in acts of parliament and other public documents, which has been interpreted by some lawyers as any person having an interest or property in land other than for a term of years. This definition would of course include the freeholder, or the copyholder, whether in fee or for life. Some lawyers, however, have objected to this definition, on the ground that a mortgagee would be included, which they contend is contrary to the meaning of the term. In the strict architectural sense, it is generally used in contradistinction to BUILDING OWNER, and OWNER (ADJOINING). INGRAM, *Compensation to Land and House Owners*, 12mo., London, 1861; YOOL, *Compensation to Land Owners*, 8vo., London, 1864. A. A.

LANDSCAPE GARDENER. In the British Islands, the persons employed to arrange the scenery of pleasure grounds and to design ornamental gardens, form three classes: 1, the head or master gardener, who, having laid out property under some professor of the art, begins a career of independence as *ground workman*; such were C. Bridgman, L. Brown, etc.; 2, the architect who, directing his practice chiefly to country buildings and acquiring a knowledge of rural matters and the effects of scenery, combines with architecture the laying out of grounds, but leaves the execution of his ideas to the practical skill of his client's gardeners; (he is frequently called a *ground-architect* as well as a *landscape-gardener*;) such were W. Kent, H. Holland, J. B. Papworth, etc.; 3, the artist who has been educated to arrange such scenery and grounds, and who is a

real professor of the art of LANDSCAPE GARDENING, or a *landscape gardener*; such were H. Repton, who (about 1786) assumed that title, and probably his predecessors Wright (who never contracted) and J. Ramsay.

The two latter classes have in general not been contractors for the execution of their designs, which in too many cases at the present time they are not even engaged to superintend, because its performance is entirely confided, for supposed economy, to some member of the class first named. The operator in such an event is either a master gardener or *ground-workman* (of late years the *new ground-workman* or navigator has appeared) who contracts for extensive works, such as forming plantations, pieces of water, roads and paths, kitchen-gardens, and even hot-houses and other garden structures and buildings (a branch of business which, especially in the time of Brown, was combined with that of the architect-gardener or artist-gardener); or else he is a head-gardener (probably recommended by a respectable nurseryman knowing the sort of garden and garden scenery to be managed), who will afterwards have the management of the garden scenery, including the park as far as respects the trees and grass and the internal plantations or forests, and who (in the same manner that builders pretend to be able to supersede architects) assumes without any artistic knowledge the position of landscape-gardener, frequently acts as *garden-architect* by devising the structures and ornaments belonging to that portion of the property, and in some cases provides the design for the mansion and offices; e.g., L. Brown at Fisherwick co. Stafford, for the earl of Donegal; and Sir J. Paxton at Mentmore, co. Bucks, for baron Rothschild.

The Scottish *planner* is a garden or horticultural architect, who gives designs for kitchen and flower gardens with their structures and buildings: he sometimes also lays out shrubberies and pleasure-grounds when on a small scale, and in this case he takes the title of *planner of policies, ornamental gardener, or ground architect*; he is the *artiste jardinier, or ingénieur des jardins pittoresques ou anglais*. There are many artists in gardening (*artistes jardiniers, architectes des jardins, architectes paysagistes* explaining their occupation as the *création et plantation de parcs et jardins, and jardiniers paysagistes*, in France, who chiefly reside in Paris: but it does not appear that they have caught the principles of the modern English style: in Holland they are generally employed to lay out parks or pleasure-grounds of greater extent than those usually confided in that country to practical gardeners, who there, as in Germany, lay out flower gardens or walled kitchen gardens. Any work on a larger scale in Germany is either designed by the *land-baumeister* or architect whose attention is chiefly given to country buildings, or by the *garten-künstler* or *garten-baumeister*, who is generally a practical gardener who has learnt surveying and has visited other large works. In Italy there are the *architetti rustici*, who adopt the rural branch of their art, and who give plans (chiefly or almost entirely in the geometrical style) to be executed under the direction of themselves or of head-gardeners; and the *artisti giardinieri*, usually at the head of some great public or private establishment, who design pleasure-grounds in what they consider the English style, and gardens (generally horticultural), directing by occasional visits or by contract, the execution and future inspection of the work: LONDON, *Encyc. of Gardening*, 8vo., London, 1850, § 145, 202, 292, 406, 717, 6299, 6312-4, 6353, 6430.

LANDSCAPE GARDENING. In its full sense this term (apparently invented by W. Shenstone, who died 1763) is given to the occupation of creating beautiful scenery out of plain unornamented ground: a more confined interpretation expresses it as the business of designing, constructing, and decorating the different parts, which compose the external scenery of a country residence, in conformity with the requirements of convenience and beauty. It is therefore both a fine art and a science.

The style which was displayed in the *horti* of the Romans (AMBULATIO; HIPPODROME; XYSTUS) was revived in modern

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Italy, where one of the best examples of a real ITALIAN GARDEN is by Vignola at the villa Farnesiana on the Palatine hill at Rome. In the great work by Du Cerceau there is scarcely a plot that is not shown as a *PARTERRE* or a *MAZE*; these have been the main subjects of continental and English publications on gardening until the middle of the eighteenth century. The combination of these features with trees in the grandest manner, was accomplished by Le Nôtre at Versailles. But from the hydraulic toys in the gardens of Italy arose the taste for hydraulic objects as points of view, even such as were published by Caus, which although nearly abolished in England, still affect the French and German PLEASURE GROUNDS whether laid out in the geometrical or the natural manner of ORNAMENTAL GARDENING. It will be observed in the following paragraphs, that the mere pleasure garden, such as that of the Horticultural Society at South Kensington, is not considered in this article as importantly entering into the scope of landscape gardening: the list of publications at the end necessarily includes both subjects.

As a fine art, it is asserted by most writers that it requires, on the part of the professor, the exercise of a fertile imagination in the management of form and colour, which must be controlled by a sedate judgment, and be aided by knowledge, of the history of the art as cultivated by various nations, as well as of the critical and philosophical part of fine art in general (ÆSTHETICS), in which cases an acquaintance with at least the French and German languages is very desirable. An attempt to give a general view of the history of landscape and of other branches of gardening forms the first portion of LONDON, *Encyc. of Gardening*, 8vo., London, 1850: but the part useful to the student in England may be presented in a much more condensed form. The art has two styles, the *Ancient*, Geometrical, Regular, or Architectural, style, suited to contrast with wild scenery; and the *Modern*, Natural, Irregular, Picturesque, or Landscape, style, opposed to the general character of any country subject to high cultivation; these two styles are often combined by Repton's successors.

The principles of ancient gardening may thus be stated:—
 "1, the natural beauties or defects of a situation had no influence when it was the fashion to exclude, by lofty walls, every surrounding object: 2, these walls were never considered as defects, but on the contrary, were ornamented with vases, expensive iron gates, and palisades, to render them more conspicuous: 3, so far from making gardens appear natural, every expedient was used to display the expensive efforts of art by which nature had been subdued; the ground was levelled by a line; the water was squared, or scooped into regular basins; the trees, if not clipped into artificial shape, were at least so planted by line and measurement that the formal hand of art could nowhere be mistaken: 4, and lastly, with respect to objects of convenience, they were placed as near the house as possible; the stables, the barns, and the kitchen-garden, were among the ornaments of a place; while the village, the almshouse, the parish school, and churchyard, were not attempted to be concealed by the walls or palisades that divided them from the embellished pleasure-ground. The perfection of (modern) landscape gardening consists in the four following requisites:—1, it must display the natural beauties, and hide the natural defects, of every situation: 2, it should give the appearance of extent and freedom, by carefully disguising or hiding the boundary: 3, it must studiously conceal every interference of art, however expensive, by which the scenery is improved, making the whole appear the production of nature only; and 4, all objects of mere convenience or comfort, if incapable of being made ornamental, or of becoming proper parts of the general scenery, must be removed or concealed"; REPTON, *Sketches and Hints*, 4to., London, 1795, chap. vi; which should be compared with GILPIN, *Practical Hints*, 8vo., London, 1832, as the latest theoretical discussion of principles.

Modifications of each of these styles have arisen from geolo-

gical or national circumstances, and may be called *schools*. Thus the Italian school of the Geometrical style is characterized by terraces, blank walls, steps, and ornamental sculpture; the French school by avenues and parterres; and the Dutch school by canals and grassy terraces. The Chinese school of the Natural style has been considered (perhaps justly) the real parent of the *modern* style, which when first displayed in England, was distinctly marked by the absence of everything having the appearance of a terrace, or of architectural forms or lines immediately adjoining the house. This was the manner of W. Kent, supported by W. Shenstone, G. Mason, T. Whately, and the Rev. W. Mason; the two latter authors give a clear view of the "modern" style. The smooth, bare, and almost bald appearance of Kent's manner, gave rise to the rough manner which assumed to be "the Picturesque", and was advocated by the Rev. W. Gilpin, R. P. Knight, and U. Price, which, though adopted in many instances in some parts of an estate, was only in very few cases exclusively employed. The labours of the two last named authors prepared the way for the general adoption of Repton's manner, which, as soon as the rage for destroying avenues and terraces had subsided, and the propriety of uniting a country house with the surrounding scenery by architectural appendages had been discovered, prevailed in spite of a sort of decline and inactivity of taste that occurred 1800-10, and is still received, even by the "Botanical" mannerists. For a condensation of the principles of his school in their application to an estate varying from five to fifty acres, reference may be made to his follower PAPWORTH, *Hints on Ornamental Gardening*, 4to., Lond., 1823. For the enunciation of the principles themselves, in connection with the treatment of property embracing two or three hundred or more acres, the student should consult the five works by REPTON himself, or at least the reprint of them, 8vo., London, 1840, by Loudon, who in his *Introduction* to that edition endeavoured to eulogise a school which he called the Gardenesque (more properly the Botanical), being "a manner of laying out ground to display the individual beauty of trees and other plants arranged in regard to their kinds and dimensions", as described in the *GARDENER'S MAGAZINE*, 8vo., London, 1839, xv: it had been put forward by himself in *Observations on Plantations*, etc., 8vo., Edinb., 1804. The difficulties experienced even by persons who may be supposed to understand the æsthetics of landscape gardening, will present themselves to the careful peruser of LOUDON, *Encyc. of Gardening*, 8vo., London, 1850, in the sections 1456-1591. Indeed in that work, § 590, LOUDON characterizes REPTON's published remarks on landscape gardening as "puerile, wanting depth, often at variance with each other, and abounding too much in affectation and arrogance"; but in his *Introduction* above named, the same writer says that Repton's school "may be considered as combining all that was excellent in the former schools, and, in fact, as consisting of the union of an artistical knowledge of the subject with good taste and good sense."

As a science landscape gardening demands some knowledge of architecture, surveying, mechanics, hydraulics, agriculture, and botany, in the professor, whether his services are engaged for laying out a space of a few square yards, or for improving hundreds of contiguous acres. His means will be alteration of shape of ground, introduction of water, plantations, meadows, paddocks, lawns, pleasure grounds, shrubberies, and flower-gardens, with drives, rides, and walks, besides (most important of all in some cases) removal of existing objects: the *Encyc. of Gardening*, § 2327-97, and 6188-257, contains very useful observations on matters which may occur in carrying his design into execution. Of arboriculture, or the management of trees and shrubs, the landscape gardener should know sufficient at least to understand the disputes between practical men upon the comparative fitness of hedges, single trees, rows, strips, groups, thickets, copses, clumps, and belts in valleys and on flat land, or on rolling ground and absolute hills; the time and

method of forming plantations; the selection of nurses; the mixture of different species; the soil and situation suited to each of them; and other subjects treated in the *Encyc.*, § 5706-6187; and in the same author's *Encyc. of Trees and Shrubs*; but he had better not be a timber-surveyor. As regards floriculture and horticulture, he is liable to be consulted upon the situation, extent, and form of the gardens; to be desired to lay out their areas upon the ground; to supply drawings for the erection of the several buildings required (CONSERVATORY, FRUIT ROOM, HOTHOUSE, VINERY); and to design, or assist in selecting, decorations such as fountains, grottoes, seats, vases, etc.

"That which prevents the gardening of Britain from attaining to a much higher degree of perfection as an *art of taste*, is not any natural deficiency in our climate or soil, nor the want of means to make the most of them, but the want of taste in the proprietors; for after all that has been done and written, there appear to be few who have a just relish for that sort of beauty in pleasure-grounds which is properly called picturesque, or such as a painter might introduce in a picture. We do not allude to any objects or arrangements which would interfere with utility; but to such a disposition of forms as painters call grouping, connection, harmony, and above all, to that general result which is called unity of expression or character"; LOUDON, § 979.

WALPOLE, *On Modern Gardening*, 4to., London, 1785, also appended to *Anecdotes of Painting*, etc., with a supp., 8vo., London, 1862, p. 783-838; FELTON, *Portraits of English Authors on Gardening*, etc., 8vo., London, 1830.

SHENSTONE, *Thoughts on Laying out Grounds*, vol. ii of *Works*, 8vo., 1765; WHEATLEY or WHATELEY, *Observations on Modern Gardening*, 4to., 1770, translated into French by LATAPIE; with *A Discourse on the Origin of the Art*, 8vo., 1771; PRICE, *Essay on the Picturesque in Scenery and Landscape Gardening*, 8vo., 1794; with additions, 8vo., 1796; a vol. ii, Hereford, 1798, contained *Essays on Artificial Water; On Decorations near the House; and On Architecture and Buildings as connected with Scenery*; and with *Essay on Taste*, by J. D. LAUDER, 1842; REPTON, *Letter to U. Price, Esq., on Landscape Gardening*, 8vo., 1794; REPTON, *Sketches and Hints on Landscape Gardening*, 4to., 1795; PRICE, *A Letter to H. Repton, Esq., on the Application and Principles of Landscape Painting to Landscape Gardening*; supp. to the above, 8vo., 1795; MASON, *Essay on Design in Gardening*, 8vo., 1795, best edition; KNIGHT, *Landscape, a Poem*, 4to., 1796; MARSHALL, *A Review of the Landscape, a Poem*; also of *Essay on the Picturesque*, etc., 8vo., 1795; MARSHALL, *Planting and Rural Ornament*, 2nd edit., 8vo., 1796; SMITH, *Remarks on Rural Scenery; Etchings of Cottages from Nature; and Observations relative to the Picturesque*, 4to., 1797; GILPIN (W.), *Works on the Picturesque in Landscape Scenery and Gardening*, etc., 8vo., 1800-8; ANON., *Description Pittoresque des Jardins du goût les plus modernes*, 4to., 1802; REPTON, *Observations on the Theory, etc., of Landscape Gardening*, 4to., 1803; LOUDON, *Treatise on Forming, Improving, etc., Country Residences, and the Choice of Situations*, 4to., 1806; REPTON, *Inquiry into the Changes in Taste in Landscape Gardening*, 8vo., 1806; A LADY, *The Florist's Manual*, 12mo., London, 1806; ANON., *Engravings with Description of the Modern Style of Rural Architecture and the Improvement of Scenery*, 4to., 1807; DE LABORDE and BOURGEOIS, *Description des nouveaux Jardins, etc., de France*, in three languages, fol., Paris, 1808-15; KRAFFT, *Plans, etc., des plus beaux Jardins Pittoresques de France, d'Angleterre, et d'Allemagne, et des édifices, etc., qui concourent à leur embellissement dans tous les genres d'architecture*, 4to., 1809; ANON., *Hints on the Formation of Gardens and Pleasure Grounds*, 4to., 1812; LOUDON, *On Laying out Farms, Grounds, etc., in the Scotch Style*, 4to., 1812; REPTON, *Fragments on the Theory, etc., of Landscape Gardening*, 4to., 1816; PAPWORTH, *Hints on Ornamental Gardening*, 4to., 1823; PHILLIPS,

Sylva Florifera; and Observations on Form of Ornamental Plantation and Pictorial Scenery, 8vo., 1823; THOUIN, *Plans raisonnés de toutes les espèces de Jardins*, fol., 1823; WATSON, *Dendrologia Britannica; or Trees and Shrubs that will live in the open air of Britain throughout the year*, 172 coloured plates, 8vo., London, 1825; MORRIS, *Essays on Landscape Gardening, Laying out Grounds*, 4to., 1825, 1827; FOSBROKE, *Tourist's Grammar; or Rules relating to Scenery and Antiq.; including an Epitome of Gilpin's Principles of the Picturesque*, 12mo., London, 1826; M(EASON), *On the Landscape Architecture of the Great Painters of Italy*, 4to., 1828; LALOS, *De la Composition des Parcs et Jardins Pittoresques*, 5th edit., 8vo., Paris, 1832; GILPIN (W. S.), *Practical Hints upon Landscape Gardening*, etc., 8vo., 1832; DENNIS, *Landscape Gardener, comprising the History and Principles of Tasteful Horticulture*, 8vo., 1835; LONDON, *Suburban Gardener and Villa Companion*, 8vo., 1838; LONDON, *The Derby Arboretum*, 8vo., 1840; LONDON, *Landscape Gardening and Landscape Architecture of the late H. Repton*, 8vo., 1840; KENNION, *On Trees in Landscape*, 4to., 1844; DOWNING, *Treatise on the Theory and Practice of Landscape Gardening*, etc., 8vo., New York, 1849; KEMP, *Parks, etc.*, of London, etc., 8vo., 1851; KEMP, *How to lay out a Small Garden; Plans*, etc., 8vo., 1851; new edit., 1864; MAJOR, *Theory and Practice of Landscape Gardening*, 4to., 1852; TWINING, *Elements of Picturesque Scenery*, 8vo., 1852; STANDISH and NOBLE, *Practical Hints on Ornamental Plants and Planting*, 8vo., 1852; SMITH (C. H.), *Parks and Pleasure Grounds*, 8vo., 1852; WEBSTER and PARKES, *Encyclopædia of Domestic Economy*, 8vo., 1852; MCINTOSH, *The Book of the Garden*, 8vo., Edinb., 1853-55; HAYWARD, *Plans of Gardens; Geometric Flower Beds for Everybody's Garden*, 4to., 1858, new edit.; BROOKE, *Gardens of England*, fol., 1858; MAJOR, *Ladies' Assistant in the Formation of their Flower Garden*, etc., Plans, 4to., 1861; SIEBECK, *Art of Landscape Gardening, represented in a Plan and elucidated by the Determining Motives*, 4to., 1862; PEZZOLD, *Die Landschafts Gartnerie*, 20 pl., 8vo., Leipzig, 1862; HUGHES, *Garden Architecture and Landscape Gardening*, etc., 8vo., 1866.

LANDSCAPE MARBLE, also called Florentine marble. An argillaceous material so hard as to admit of a certain degree of polish. It is sometimes called 'Ruin marble', owing to its being discoloured by natural causes so as sometimes to suggest the idea of buildings. In the same way the dendritic appearances presented on the polished surface of a fragment of it has suggested this name of 'landscape marble.' Besides being very common at Val d'Arno near Florence, in Italy, it may be met with in the rocks near Clifton, and probably elsewhere.

s. s.

LANDSHUT (JACOB VON), *werkmeister*, designed 1494 the Lorenzkapelle (not the present chapel so called, which was that of S. Martin) on the north side of the cathedral at Strasburg: it was completed 1505. He died 1495; his epitaph, placed on the right of the door to the sacristy of the choir, is given in GRANDIDIER, *Essais—sur l'église*, 8vo., Stras., 1782, p. 64, 321; who, p. 423, states that Landshut succeeded H. Hammerer.

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LAND SURVEYING. The art of measuring, and plotting on paper, and of computing the superficial contents of one or more fields, or an estate, parish, etc. This is done in two ways at present in ordinary surveys: either by the chain only, in which case the whole work must be brought into a series of triangles, each based on another: or by taking lengths with the chain, and angles with the theodolite, sextant, azimuth compass, or some other similar instrument. In both cases all irregular lines must be ascertained by taking offsets. Check lines, or check angles, should also be frequently taken so that there be no error in the work. These errors take place generally by misreading the brasses on the chain, the same marks being necessarily at 60 links as at 40, and at 70 links as at 30. Similar errors also occur in reading off degrees, and sometimes

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the wrong end of the vernier has been observed. One golden rule for the land surveyor is first to observe, then to book the dimension or angle, and then to observe once more to see that all is right. In larger surveys, as in parishes, it is best to drive one or more long base lines through the whole work, leaving marks from which to make the lesser triangulations. If it be possible to take them so that they may cross each other, and can be checked by lengths or by angles it is better to do so. In still larger surveys the work is better to be done trigonometrically, a base being first most carefully measured and a series of angles taken from both its ends to every accessible elevated spot in sight, and so continued from one to the other till the country is covered as it were with a net-work of triangulation. Of course these angles when the objects are distant are to be equated for the depression due to the curvature of the surface of the earth. In the late Ordnance Surveys some of the longest observations were made at night by the assistance of the lime, or bude, or magnesian, lights.

In former times, surveys of land were mostly made by the plane table, or by the cross staff, but the later methods have been so superior in point both of convenience and quickness, as well as of correctness, that these have been quite superseded and become obsolete.

In railway surveys, it is not only necessary to take plans to shew the superficial quantities of land, but also to take levels from which to compute the cubic quantities of earth required to be excavated. ACRE; CHAIN; CROSS STAFF; LEVEL; MAP; OFF-SET; PLAN; PLANE TABLE; PLOTTING; SEXTANT; SURVEYOR; THEODOLITE; VARIATION OF COMPASS, etc. A. A.

LAND SURVEYING. A term applied to making a survey of land for the purposes of fixing a rent, or value of tillages, etc. COMPENSATION; COMPULSORY SALE; VALUER. A. A.

LAND SURVEYOR. The person who measures and plans, or who values, land, tillage, etc., as is described in the foregoing articles. Among the Romans there was a college of these professors called *agrimensores*: and in France and Belgium they are sworn officers under the state, and called *agrimenseurs jurés* to the present day.

A. A.

LAND TAX. A tax on all freehold and copyhold property, tithes, and other real estates, was first levied in the reign of William and Mary. A valuation was then made of all the property in each county or district, and an assessment of four shillings in the pound laid thereon. The amount thus assessed on each county is collected *pro rata* from every owner of such property. As this total amount has never been varied, the land tax on the agricultural counties remains much as it has been for many years. But in districts where there have been improvements the tax on such property has been most materially diminished, as it is only necessary for each district to make up a gross sum to be paid to the officers of the crown. The history and the law on the subject are beside the object of this work. The architect and surveyor are, however, very frequently consulted on the subject of the *redemption of land tax*. It having been found that an impost of 20 per cent. was a great bar to the improvement of land, and particularly the building of houses, several acts were passed, under which the tax can be redeemed or bought off, and the land with all future improvements remains free. Every prudent person, therefore, will redeem before building, or before the construction of any road, canal, dock, quay, or other improvement. The sum chargeable on the land is then bought off by the owner, according to the price of consols at the period. Thus if the land be assessed at £10 per annum, and the price of funds be 94, then as 3 : 94 :: 10 : £313 : 6 : 8, the amount to be paid to the crown officers at Somerset House to free the land from any future payments on account of land tax. The value per ann. is assessed by the crown surveyors; and if the owner be dissatisfied, he can appeal to the Commissioners of Land Tax, appointed in every district, who sit at certain stated periods to hear appeals, and determine between the crown and the public.

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The surveyor called in to give evidence must do so on the basis of a "times value", that is, the land must be valued exactly as it is at the time of the application to redeem. If no roads have been made, it must be estimated as agricultural or occupation land; but if roads are made, then it is valued by the foot as building land. If there are houses thereon, they are valued according to the principal of the Parochial Assessment Acts. **RATING.** It is not, perhaps, the duty of every architect to inquire before building whether there is any land tax on the ground, because the law and custom are so widely known; but when he is concerned for those who are unacquainted with matters of business, it would be well if he made the inquiry, and advise accordingly.

The history of this imposition has been given in MACAULAY, *History of England*, 8vo., London, 1855, iv, 315; and by MACCULLOCH, in the *Encyclopædia Britannica*, s. v. Taxation, 8th edit., 1860, xxi, 44. The injustice and impolicy of such taxation have been discussed and exposed therein. A. A.

LAND TIE. The iron rod or timber beam secured at one end to a pile or wall, as of an embankment, and at the other end to another pile or other work inland, for the purpose of strengthening the general construction of the erection, and preventing the weight of earth from forcing out the wall.

LANDTNER (DIETRICH), of Pirna, designed the hof-pfarrkirche dedicated to S. Augustin, at Vienna, which was built 1330-9 and modernized 1786. 26.

LANE (JOHN) was clerk of the works at Chelsea Hospital, London, from his appointment 9 January 1728-9 until 1753.

LANE (Lat. *viculus*; It. *vicolo*; Sp. *callejuela*; Fr. *ruelle*; Ger. *gassein*). "A street is a broad and maine way for horsemen and footmen to passe, and where great store of passengers walk and travelye to and froe, especially in a citie or towne: and it differeth from a lane in this, that a lane is not so usually frequented, neither is there any such necessity for the use thereof, and it is far lesse, and yeldeth not like scope for manie people to pass: an alley differeth greatly from them both, in that it yieldeth not passage, but hath a stop, which forcth such as pass into it to retire"; **NORDEN**, *Descr. of Westminster*, as extracted in **NICHOLS**, *Progresses—of Elizabeth*, 4to., London, 1823, p. 414. **ALLEY**; **PASSAGE**; **STREET**.

LANFRANCHI (. . .) designed 1667 the church of S. Rocco; 1661 that called La Visitazione; and that called la basilica magistrale; the façade of stone is by Cav. Mosca; also 1683 the palazzo di città; all at Turin: **STEFANI**, *Torino*, 8vo., Turin, 1852, p. 54, 66, 77.

LANFRANCO, see **FACCI (L.)**; also **COMITÉ HISTORIQUE**, *Bulletin*, 8vo., Paris, 1842-3, ii, 58; and **TIRABOSCHI**, *Not. di Pitt. Modenesi*, 4to., Modena, 1786, p. 237.

LANFRANI (JACOPO or GIACOMO) of Venice, studied at Siena under Agnolo and Agostino. He built the church of S. Francesco at Imola, and carved 1343 the bas-relief for its principal portal, which bears his name and the date; built 1347-49 the church of S. Antonio di Castello at Venice, given in **CARLEYARI**, *Fabbriche di Venezia*, fol., Venice, 1703; and constructed 1347 the marble mausoleum for Taddeo Pepoli, with that for doctor Giovanni Andrea Carduino (properly Calderino) in the church of S. Domenico at Bologna. 32. 73.

LANGENBERG (MEISTER JOHANNES VON), from Cologne, was 1492-1522 engaged upon the works of the Victorskirche at Xanten. 92.

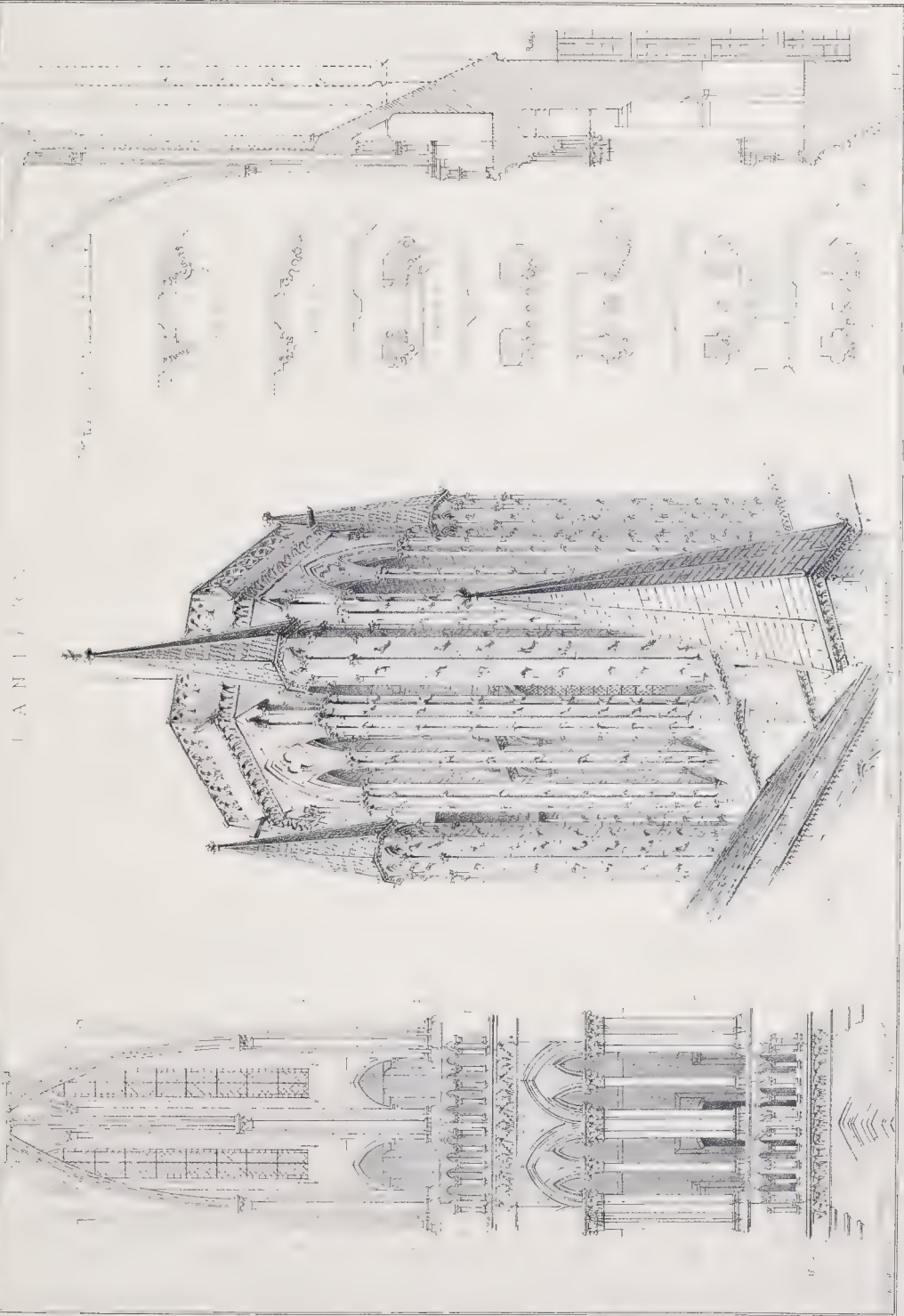
LANGHANS (KARL GOTTHARD) was born 1733 at Landshut in Prussian Silesia. He studied mathematics at Halle, and travelled 1759-75 through Holland, England, France, and Italy. On his return he was appointed *kreigs* and *oberbau*rath at Breslau, where he constructed the palace for prince Hatzfeld; the theatre, and the shooting house for merchants; the exchange; the church of the 11,000 virgins; with many houses and churches for the prebendaries; besides the great *armenhaus* (poorhouse) at Kreuzburg. About 1785 he was invited to Berlin, and appointed *kriegsrath* and *oberhofbau-*

meister. Among the most important of his designs in that city, is 1789-93 the Brandenburger-thor, forming one of the chief entrances. The first idea for this work seems to have been derived from the king himself, and the minister Wöllner, then superintendent of the royal buildings: Langhans was assisted by *oberbau*rath Lessing, and *oberhofbauinspektor* Held: **LANGER**, *Original Ansichten*, 4to., Darmstadt, 1858, xi, pl. 2; and **BERLIN** and *its Treasures* (Payne) 4to., Leipzig (1853 8), p. 49-52; each give an illustration of the gate. In 1790 he added 20 ft. to the tower of S. Mary's church: 1790-2 designed the Hercules bridge of stone, also called the Monbijou bridge, with large groups of statuary in sandstone by Schadow; and 1801-2, the national theatre, 244 ft. long, 116 ft. wide, by 57 ft. high; it contained 1,800 to 2,000 persons; its *salle* was 49½ ft. long, 45 ft. wide, by 50 ft. high; the concert room was 80 ft. long, 49 ft. wide, and 40 ft. high; the whole having been destroyed by fire in 1817, it was replaced by the present *schauspielhaus*, by Schinkel. The colonnade in Mohrenstrasse; the palace of prince Wilhelm (son of Friedrich Wilhelm II); the palace theatre at Charlottenburg; and other edifices, were also erected from the designs of Langhans, who died 1808 at Grüneiche near Breslau; but "2 October 1808 at Berlin, at the age of seventy-six," as stated in **BERLIN**, etc., p. 52. He was one of the first to introduce the simplicity of Greek architecture, in opposition to the false French taste then prevailing, and an example of this is the Heiligensee palace built 1786-97 by Gontard under his control. 68. 69. 116.

LANGLADE (GERARD), a Frenchman, constructed 1718-24 the viaduct called Ponte di Carignano at GENOA, which connects two elevated hills, and is sufficiently wide to let four carriages pass abreast. 69.

LANGLEY (BATTY), submitted 1735 a design for the proposed mansion house for the lord mayor of London, which has been engraved (King's Collection, B. M.); and 1736 a design for the bridge at New Palace-yard, Westminster; he also made the drawings to scale for the plan and four elevations of Windsor Castle (same collection), which were published 1743. **WALPOLE**, *Lives*, states that he invented an artificial stone, of which he made figures. **ELMES**, *Lectures*, 8vo., London, 1821, p. 390, and in the *CIVIL ENGINEER Journal*, 1847, x, 270, considers that Langley "formed a school of excellent workmen, although his taste as an architect was deservedly derided." He died 3 March 1751, and is recorded as 'surveyor and architect'. A quarto mezzotint portrait 1741 exists of him, with the name of Carwithian as engraver or printseller; **SMITH**, *Antiq. of Westminster*, 4to., London, 1807, p. 251; **GOUGH**, *British Topography*, 4to., London, 1780, p. 635, 736-7.

The following list comprises his many publications:—*An accurate Description of Newgate*, etc. ("by B. L. of Twickenham"), 8vo., 1724; *Practical Geometry, applied to the Useful Arts of Building, Surveying, Gardening, and Mensuration*, 41 pl., fol., 1726; 1729; *A Sure Guide to Builders, or the Principles and Practice of Architecture made easy for the use of Workmen*, pl., 4to., 1726; 1729; *New Principles of Gardening; or the laying out and planting Parterres, Groves, Wildernesses, Labyrinths, Avenues, Parks, etc.*, pl., 4to., 1728; *The Landed Gentleman's Useful Companion; or a sure and easy Method of Improving Estates by Trees*, 1 pl., 8vo., 1728, 1741; *Pomona, or the Fruit Garden Illustrated*, pl., 4to., 1729; *Young Builder's Rudiments, with the Five Orders of Columns in Architecture*, 29 pl., 4to., 1730; *Ancient Masonry, both in the Theory and the Practice, demonstrating the useful rules of Geometry and Architecture*, 466 pl., fol., 1734 or 35; 1736; *Reply to Mr. J. James's Review of the several Pamphlets and Schemes that have been offered to the Publick, for the Building of a Bridge at Westminster*, 1 pl., 8vo., 1737; *Builder's Complete Assistant, or a Library of Art and Sciences, necessary to Builders and Workmen in general*, 2 vols., 77 pl., 8vo., 1738; (4th edit. after 1788); *The City and Country Builder's and Workman's Treasury of Designs, or the Art of Drawing*





and *Working the Ornamental Parts of Architecture*, 186 pl., 4to., 1740; with 14 pl. added, 1741; 1750; 1756; *The Builder's Jewel, or Youth's Instructor and Workman's Remembrancer, explaining short and easy Rules for Drawing, etc., the Five Orders of Columns, etc.*, 100 pl., 12mo., 1741; 1768, 11th edit.; 1787; *Gothic Architecture Restored and Improved by Rules and Proportions*, 64 pl., 4to., 1742; best edit. 1747; (in this work he endeavoured to reduce Gothic architecture to a system, an attempt better achieved at a later period by T. Rickman and others); *The Builder's Director, or Bench Mate, being a Pocket Treasury of the Grecian, Roman, and Gothic Orders of Architecture*, 181 pl., 12mo., 1746; 1751; 1767; *The Builder's Treasury of Designs, for Piers, Gates, etc., Pulpits, etc., Roofs, etc.*, n. d. (before 1750); *London Prices of Bricklayers' Materials and Work, both of New Buildings and Repairs, etc.*, 59 pl., 8vo., 1747; 1748; 1749; 1750, 2nd edit.; 1818; and *A Survey of Westminster*, 1748 (pr. 1s.), reviewed in GENTLEMAN'S MAGAZINE, xviii, 96, as an attack on Labeyle, who is accused by Langley of pirating his plan published in 1736.

A relative, THOMAS, engraved the plates of Windsor Castle, besides a large number of those to the above works; and his name is appended to the *Gothic Architecture*, and to the *Builder's Jewel*, as their joint productions.

LANGLOIS (JEAN), is named in a bull of 1267 as the head director of the first works to the church of S. Urbain at Troyes. Of ten thousand silver marks which had been contributed by Urban IV, he had received as maître de l'œuvre 2,500 livres, for which he had not accounted when he left the work unfinished at his departure for the Crusade; COMITÉ HISTORIQUE, *Bulletin Arch.*, 8vo., Paris, 1843, i, p. 268.

LANGRES (the ancient *Andematunum Lingonum*). A town in Champagne, in the department of Haute Marne, in France, and situated on a steep hill, near the river Marne. It is the see of a bishop; nearly oval in form, and generally well built, with wide, regular, and clean streets. Two views of a Roman gateway are given in pl. 87 of LABORDE, *Monumens de France*, fol., Paris, 1816, p. 84-5, as attributed A.D. 240 to the two Gordians, it having two equal sized arches. SMITH, *Dict.*, notices the remains of two triumphal arches, one erected to Probus, and the other to Constantius Chlorus. There are few French towns in which a greater number of Roman remains have been found.

The cathedral, dedicated to S. John the Evangelist and to S. Mammès, said to date from the year 380, is of mixed styles, but chiefly of that of the twelfth century; the windows at the end of the apse being in the *style ogival secondaire*; the accessory chapels in the *style ogival tertiaire*; and the *portail*, a work of the eighteenth century; BOURASSÉ, *Cath. de France*, 4to., Tours, 1843. The choir screen 1550-55 by maître Estienne, resembles a triumphal arch. There is also 1758-72 the *hôtel de ville* with a portico of four Corinthian columns, 1774 the hotel dieu, and the Dominican monastery, all three works by N. Durand; a museum, occupying the old church of S. Didier; a library of 7,000 volumes; and a fine promenade.

NODIER and TAYLOR, *Voyages Pittoresques* (Champagne), fol., Paris, 1843-45, ii, give illustrations of the triumphal arch, la longue porte, fragments of sculpture, the apse of the cathedral, its *bas-côté*, the sacristy, the font, and the renaissance jubé; a house of the sixteenth century of good design; the *portes* du Moulins, du Marché, and de S. Didier (exterior and interior); the credence in the church of S. Géosmes, near the city; and the tomb of S. Didier in the museum. One of the columns, piers, etc., of the cathedral, is given in DE CAUMONT, *Cours d'Antiq.*, 8vo., Paris, 1830-41, pl. ix. *Mémoires de la Société Historique et Archéologique de Langres*, 4to., Langres, 1847.

LANGUEDOC MARBLE. A madreporic marble of a fiery red colour, streaked with white and grey disposed in convoluted zones. It appears to be chiefly procured from the ARCH. PUB. SOC.

vicinity of Alais (Gard), and of Portes (Hérault) in the old province of Languedoc. It is stated by BLONDEL, *Cours*, 8vo., Paris, 1771, v, 162, that one sort, obtained at Cosne in Languedoc, had a dirty vermilion red coloured ground streaked with great veins and white spots. The plinths to the pillars in the nave of the church of S. Sulpice; and the Ionic columns in the court of the château de Trianon, were formed of this marble. The other sort of marble from Narbonne, was white, grey, and blueish in colour, and was much esteemed. CLARAC states that this marble is very much admired even at Carrara, where it is shown as a curiosity, with some columns of Caunes griotte, in a small church built during the last few years: *CIVIL ENGINEER Journal*, 1839, ii, 453. At Paris the four Corinthian columns to each front of the triumphal arch in the *place du Carrousel*; and the steps leading to the sanctuary in the cathedral (the eight circular supports of the altar are of *white* Languedoc marble), are made of this marble, which weighs about 185 lbs. per foot cube. BARJOLÉ; BAUME; CAUNES.

LANGWAGEN (CHRISTIAN GORTLIUB), *baumeister*, was born 1752 at Brunswick, and studied architecture at Dresden under Krubsacius and Boëthius. About 1788 he was appointed *hof* and *kammerbaumeister* at Brunswick, and made many designs for buildings, churches, and bridges; together with those for the saloons and furniture of the duke's residence at Brunswick. He died in 1805. 68. 69.

LANI (. . .). Of this architect RACZYNSKI, *Dictionnaire du Portugal*, 8vo., Paris, 1847, p. 170, says, "Lani, architecte Polonais, maître de J. da Costa e Sylva." This appears to be an error, as s. v. Costa (p. 58), quoting CYRILLO, the same author observes "that the Milanese C. M. Ponzoni, and the Bolognese architect Lant (sic), were both masters of Costa." In the article in this dictionary s. v. Costa, this artist is called "Lant of Rome". He was in practice about 1770. 68. 88.

LANKEER-ROOD, in Persia, see SIN-SIN.

LANNOIS, LANNON, or LANOIS (DE), see DELANNOY (F. J.)

LANTANA (GIAMBATTISTA) made 1603, in competition with three other architects of Brescia, the design for the new duomo in that city, and conducted the works until his death 26 February 1627, which was caused by a disease contracted while surveying 1625, with Jacopo Tebanello, the construction of the fortifications of Tirano in the Valtellina. He was buried in the cathedral; ZAMBONI, *Memorie di Brescia*, fol., Brescia, 1778, p. 123-4-5-8, and 152; which also contains the accounts of the many controversies in respect of his and other designs for the new cathedral.

LANTERN or LANTHORN. A term which has been applied to buildings in consequence of their exhibiting a large extent of perforated wall space or window light, so as to give the effect of a framework similar to a common lanthorn. Thus Bath abbey church is stated to have been "formerly called the lantern of England, from the number of its windows"; DUGDALE, *Monasticon*, fol., London, 1819, ii, 261: the former cathedral at Elgin, in Scotland, was called the 'lanthorn of the north'; and S. John's priory at Kilkenny, the 'lantern of Ireland', by Dr. CAMPBELL, from the extensive window in the south side of the choir, 54 ft. long.

The term is also given to the upper part of towers of cathedrals and churches; such as those at Boston church; and All Saints church at York; both of these are said to have been illuminated for beacon lights as at other places (LANDMARK); Trinity church, Coventry; Ludlow church; Ely cathedral; Fotheringay church; and other places.

An opening into the tower, in the interior, above the roof, is also called a lantern; RICKMAN, *Attempt*, 8vo., London, 1818, p. 49; this probably means the lower part of the tower when placed at the cross of a church, and having windows in it on all sides, to throw light into the intersection of the transepts, or "crossing" as it is sometimes called. This crossing is covered by a *tiburio* at Milan.

A lantern on the roof of a church with a small spire marking

the choir, is called in German *dach reiter* or roof rider. OTTE, p. 21, observes that the fine churches of the Franciscan and Dominican Orders often exhibit only this adjunct, to which the Cistercian Order is restricted, for a belfry. SANCTE BELL cot. For a similar erection on a hall, see LOUVRE. 92.

It is also the term (It. *cupolino*, *lanternino*, *pergamena*; Sp. *cupolino*, *lanterna*, *linterna*) given to the vertical work surmounting a dome, as at S. Peter's and S. Paul's cathedrals. CAPITAL OF A LANTERN.

In the middle of the cloisters of S. John's church at Brixen, is a stone structure of good detail, raised to hold a lamp; it is a square niche open on four sides, capped by a pyramidal roof, and supported on an octagonal base; it is dated 1483; WEBB, *Ecclesiology*, 8vo., London, 1848, p. 178. This may perhaps be a sort of CEMETERY BEACON.

The term has also been given to a subterranean circular cell hardly 5 ft. in diameter, built of small pieces of faced chalk, with a passage leading to it, not in a straight line, but having a return and a cant altogether about 30 ft. in length, built of flints laid in and grouted, situate under the cloister area of the Cluniac priory of S. Pancras at Lewes, the entrance being from the underwork of a building adjoining the south cloister. It is supposed that this dark structure was a prison or penitential cell; the term *lantern* for a place of confinement can be adduced from the Cluniac statutes, and of the word *lantern* in a like sense from the examination of the Lollard preacher, Thorpe, before archbishop Arundel in 1407. Such may have been the use of the subterranean passages in sites of religious houses, now generally supposed to lead to some neighbouring church or castle. A plan and section of it are given in the ARCHEOLOGICAL INSTITUTE *Journal*, 8vo., London, 1855, xii, 103-4, from the SUSSEX ARCHEOLOGICAL SOCIETY, *Collections*, 8vo., 1854, vii.

A glazed framework made to hold a light, and generally of a size to be carried about. The term might be applied to the ordinary street lamp; it is here introduced chiefly to record the fine example at the palazzo Strozzi, at Florence, given in the *Illustrations*, as executed by N. Grosso Caparra; VASARI, *Vita di* (Pollaiuolo) *Cronaca*, calls them "lumieri maravigliosi"; they are placed about 15 ft. from the ground.

LANTERN, or LANTERN LIGHT. A cage of carpentry or iron placed over an opening in a roof, a staircase, a gallery, or an apartment, to give light from above. The *lantern* differs from the *skylight*, as the construction is altogether raised above the roof, the windows being vertical instead of horizontal or inclined. It is sometimes roofed with glass, but ordinarily with slate, lead, etc. The windows may be hung on pivots, or as sashes, but are often fitted with lines or machinery to open from below, as they are in general difficult of access. As the surface of the glass cools the air very rapidly and creates 'down draughts', it is not unusual to form a species of flat ceiling of glass below the lantern, portions of which can be opened in hot weather. An example is given in *BUILDING NEWS Journal*, 1859, v, 41. SKYLIGHT.

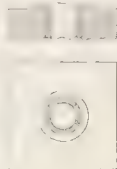
As regards the display of light, it has been said that the lantern of the former exhibition room of the Royal Academy in Somerset House, gave a ratio of 1 to 106; and including the space of the lantern itself, of 1 to 120. PICTURE GALLERY.

LANTERN BELL TURRET. A name given to the bell turret of the church of S. Helen at York, shown in the *Journal* of the ARCHEOLOGICAL INSTITUTE, iv, 131.

LANTOIN (ESPRIT BERNARD), was born 1787 at Aix, and studied architecture at Marseilles under P. Coste. In 1820 he was appointed architect to the département Var; and designed 1824 with Baltard the prisons, and with Penchaud the palais de justice, at Draguignan; also the episcopal palace, and 1828 the hospice at Fréjus; the church at Nans; the townhall at S. Raphaël; another at Lorgues; and the palais de justice with the prisons at Toulon. GOURLIER, etc., *Choix des édifices*

publics, fol., Paris, 1825-50, illustrates i, pl. 71-2, the works at Draguignan; and i, pl. 69, the hospice. 110.

LAODICEIA AD LYCUM (now called by the Turks, Eski Hissar or old castle). An ancient ruined city in Asia Minor, formerly the capital of the Greater Phrygia, situated about a mile from the river Lycus; it is the site of one of the seven primitive Christian churches of Asia, and the see of a bishop. Nothing but very extensive ruins of inferior architectural merit remain to point out its locality: they comprise three theatres (one an odeum), the largest of which is 364 ft. exterior, and 136 ft. interior, diameter, as given in *Antiq. of Ionia*, pl. 49-51; LEAKE, p. 326, remarks that this building "is also an exception to the rules of VIRUVIUS, or rather it exemplifies a mixture of his Greek and Roman theatre; one theatre is in a state of great preservation, with its seats still perfectly horizontal, though merely laid upon gravel": a stadium almost perfect, begun by Vespasian A.D. 79-91, which as noticed by LEAKE, *Asia Minor*, 8vo., London, 1824, p. 245, 326, was converted into an amphitheatre by the Romans, according to an inscription given by CHANDLER; a plan is given by SOCIETY OF DILETTANTI, *Antiquities of Ionia*, fol., London, 1797, ii, 32, pl. 48-51; a gymnasium: remains of the vast walls; and an aqueduct, described in the *Detached Essays*, Aqueduct, p. 3, where are also noticed "the terra-cotta pipes 8½ ins. internal diameter and 1½ ins. thick, found by E. Falkener in stone tubes, as represented in the cut; the stone was about 2 ft. 9 ins. square, pierced for a tube of 11½ ins. diameter, with a nozzle 2 ins. thick projecting 1½ ins., the corresponding stone having a sinking, and each stone varied in length from 18 to 30 ins."



The ruins near Denisli are fully described by POCOCKE; CHANDLER; COCKERELL; ARUNDEL, *Seven Churches*, 1828, and *Asia Minor*, 1834; LEAKE, p. 251; FELLOWS, *Journal*, etc., p. 280; HAMILTON, *Researches*, i, p. 515; and WALSH and ALLOM, *Constantinople*, etc., 4to., 1844. 59.

LAODICEA AD MARE, now Ladikiyeh or Latakia. A city in Syria, situated south of Hecalea, built by Seleucus Nicator, and named after his mother. It was described by STRABO, xvi, pp. 751-2, as admirably built with an excellent harbour. Of the aqueduct by Herod the Great, a large fragment is still to be seen; SHAW, *Travels*, fol., London, 1757, p. 262. IRBY and MANGLES, *Travels*, 8vo., London, 1844, p. 223, notice an old gateway and other antiquities, with sarcophagi and caves in the neighbourhood. SHAW describes the gateway; also POCOCKE, *Deser. of the East*, fol., London, 1743-5, ii, 197, as a remarkable triumphal arch almost entire, with four entrances like the arcus Jani at Rome, and conjectured to have been built in honor of Lucius Verus (A.D. 161-180) or of Septimius Severus (193-211). 59.

More than a mile of the country to the north of the city is covered with ruins of sepulchres of hewn stone, with inscriptions (all either Syrian or Greek), and foliages engraved on one side of most of them: they are entirely open, and dug out of the solid rock. On the south are more noble vestiges of ancient grandeur than in the city itself, consisting of pieces of granite pillars, capitals, pedestals, some among them larger than any to be found at present in any part of Syria: these, and other ruins extend for the distance of two miles from the city. To the east are many of the same kind of ruins; and a broad and straight road parallel with the town in a northern and southern direction, is now the grand avenue into all parts of it; this road is said to have been formerly the main street; the triumphal arch takes up its whole breadth about half a mile to the south of the present town; PARSONS, *Travels in Asia and Africa*, 4to., London, 1808, p. 45-6.

The modern town is now open, and consists of about a thousand well built houses forming an upper and lower town; the latter, about half a mile distant, and called La Scala or La

Marina, stretches along the shore near the harbour, which is now nearly silted up, and consists of two streets, and a third leading from the lower or port town, in which are the mole having six arches; the castle thereon; a mosque; the custom-house with the aga's mansion over it; and magazines or warehouses. The other principal buildings are three Greek churches, five mosques, an Armenian convent, and a large bazaar. CHESNEY, *Euphrates Expedition*, 4to., London, 1850; MARILHAT gives a view of an ancient temple in the bazaar. 50.

LAON (the ancient Bibrax Suessionum). A town in the province of Picardy, and capital of the department of l'Aisne, in France. It is situated on an isolated hill 300 ft. high, in the midst of a plain; and is surrounded by walls and ramparts which are about four miles in circuit: the porte d'Ardon is given in *Building News Journal*, 1865, xii, p. 352-6; and in NODIER. It is an antiquated town, consisting of one rather narrow, and several smaller very narrow, streets, poorly built, though some parts have been improved: at the foot of the hill are the suburbs. The see, suppressed by Napoleon I, but re-established in 1817, is united with that of Soissons.

The cathedral, dedicated to Notre Dame, was burnt June 1112, and the new one is said to have been consecrated 6 Sept. 1114; but VIOLETT LE DUC, *Diet.*, asserts that it was almost destroyed 1190, and subsequently rebuilt. The plan presents the peculiarity of having six towers, viz. two to each transept and two at the west end (the latter are said to have been copied for those at Bamberg, DUSSEUX, *Les Artistes Français*, 8vo., Paris, 1851, p. xii), and a central tower; the south-west one had a spire 328 ft. high, taken down about 1795. The east end is square: the triforium being double, there are four stories in the interior; the circular window in the west façade is remarkable for its size, 26 ft. in the opening, and for the painted glass, apparently coeval with the structure; the rose windows in the transepts are of the fourteenth century; during the thirteenth century chapels were placed between the buttresses of the nave, and a hall was built in the small cloister on the south side, the latter deserves notice. The building much resembles the Early English style of Salisbury cathedral. Internally the length is 351 ft., the width of nave and aisles 67 ft. 7 ins., and the height to the vaulting 80 ft.: the transepts are 174 ft. from north to south, and 35 ft. 9 ins. wide between the piers: the west towers are 173 ft. high. The dimensions usually given are much too large. A general restoration was commenced in 1851 by E. Boeswilwald. VITET et RAMÉE, *Monog. de l'église de Noyon*, fol., Paris, 1845; MARION, *Essai hist. et archéol. sur l'église cath. de Laon*, 8vo., Paris, 1843; DU SOMMERARD, *Les Arts*, etc., fol., Paris, 1838-46, ser. ii, in pl. 4 represents it from the south side, with a sketch of the old spires: a plan, etc., is given in VIOLETT LE DUC, *Diet.*, s. v. Cathédrale, p. 304-9: a plan and view of the north tower is given in Wilars de HONECORT, *Album*, edit. by LASSUS, 4to., Paris, 1858, p. 93, pl. 17-18, and 65-6: COMMISSION DES MONUMENTS HISTORIQUES, *Archives*, fol., Paris, gives a plan, etc.: *BUILDING NEWS Journal*, 1865, xii, p. 610, gives a view of the south transept; p. 680, the central tower; and p. 732, the north transept: NODIER and TAYLOR, *Voyage Pittoresque*, fol., Paris, 1835-48 (Picardie), ii, represent the cathedral in thirteen plates; eight other plates of details, screens to chapels (Renaissance), etc.; with four plates of the town, citadel, ramparts, and the tour du roi Louis d'Outremer (who died there in 953), one of the oldest monuments in France, since pulled down to make way for the new citadelle: INKERSLEY, *Romanesque, etc.*, *Arch. in France*, 8vo., London, 1850, p. 68. BREWSTER, *Edinburgh Encyc.*; PENNY MAGAZINE, 1836, v, 140, gives the west front; MOYEN AGE MONUMENTALE, pl. 85, and 115.

The church of S. Martin is of Romanesque foundation; the choir and transepts are Early Pointed, and remarkable for the heavy character of the moldings, and the ingenious arrangement of the chapels and buttresses; the tombs in them are

curious; the façade dates in the fourteenth century; (five plates are given in NODIER, showing the extremely simple exterior, etc.). Among the four other churches is that of the Templars, Late Norman, now attached to a school of the *Frères de la doctrine Chrétienne* (a plate is given in NODIER).

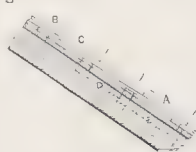
Among the other buildings of the city are, the abbey of S. Jean, said to have been once occupied by three hundred nuns and to have had seven churches within its enclosure, it is now the *hôtel de préfecture*, and contains the public library of 15,000 volumes with some rare MSS., with a museum of local antiquities; the ancient bishop's palace (a plate in NODIER), now the *palais de justice*, its chapel and crypt older than the cathedral, the great hall 1212 now divided, and the kitchen, are noticeable; the *hôtel Dieu*, formerly the abbey of S. Martin, now an extensive and well arranged hospital; the foundling hospital; the town house; the theatre; and the barracks; with the other usual establishments.

Outside the town, VERDIER et CATTOIS, *Arch. Civile*, etc., 4to., Paris, 1852, ii, p. 107, illustrate the Maladrerie du T'ortoir, as of the fourteenth century: and NODIER gives the château de Marchais (Renaissance): there is also a very curious church at Vaux sous Laon; a magnificent granary at the abbey of Vaucclair: while of the abbey of S. Vincent only the outer walls (cruettes) moated and embattled like those of a fortress (as it was) have escaped destruction; they now enclose a private garden. 28.

LAORDOSE. A supposed corruption of the Fr. *l'arrière dos* or *la veredes*, used to designate the high altar screen in Durham cathedral; J. D(AVIES), *Ancient Rites, etc.*, of Durham, 12mo., London, (1672).

LAP (Fr. *chevaucher*). A term used in carpentry to express that part of one board is laid on part of another, to prevent seeing through, or to keep out wet. It is generally used for WEATHER BOARDING, or for fencing. A. A.

It is also a term used in slating, and often confounded with 'bond'. GWILT, *Encyc.*, states that 'lap' is the part of one slate covering the one under it, as c, and not the smaller portion b, comprising the three thicknesses of slates, but the latter is the correct meaning.



LAP DOVETAILING. A process in carpentry which shows the thickness of the lap only on the return edge, having the appearance of a thin board: the other method, or 'mitre dovetailing' presents only a single line on the angle. BRES, *Diet.*, 8vo., London, 1853.

LAPERKIN. A tool used by glaziers; see LATTEKIN.

LAPHYAN. A heavy, solid wood of Amherst, in Hindostan, soon destroyed by insects. 71.

LAPI (FILIPPO DI SER BRUNELLESICO DEI), born about 1371 or in 1377 (GAYE), is generally called Filippo Brunelleschi even by VASARI. He was the son of Ser Brunellesco di Lippo Lapi, himself the son of Ventura: VASARI, *Lives*, i, 57, 415, 465. GAYE, *Carteggio Inedito*, 8vo., Florence, 1839, i, 113-4, gives the return of his property and position, dated 12 July 1427 and signed by himself "Filipo di s. brunellesco d'eta d'anni 50"; another is found dated 1430; in a third 1433 he adds "trovomi si può dire vecchio, pasati anni sesanta"; and in 1442 he touchingly observes, "anchora mi truovo vecchio, e non posso più valermi di mia industria". He died 16 April 1446 according to his epitaph, but three of his biographers fix 1444 as the year of his decease. VASARI follows an anonymous author in saying that Filippo was born 1377, with which GAYE's copy of the return dated 1427 seems to agree; but if that return showed 56 in figures, then he would have been born 1371, which would agree with the return for 1433; and again if he were 60 or more in 1433, his birth may have occurred 1371 or a little later.

His portrait in marble, taken during life by il Buggiano,

was placed at the door on the right hand entering the church of Sta. Maria del Fiore with the following inscription composed by Carlo Marsuppini, chancellor of the Republic:—"Quantum Philippus architectus arte Dædalea valuerit, cum hujus celeberrimi templi mira testudo, tum plures machinæ divino ingenio ab eo adinventæ, documento esse possunt: quapropter ob eximias sui animi dotes singularesque virtutes xv kal. Maias anno mcccc XLVI ejus b. m. corpus in hac humo supposita grata patria sepelliri jussit." In 1830 the ideal seated statues of Arnolfo and of Brunellesco by Luigi Pampaloni were placed in the new chapter-house, but they seem to have been removed before 1848 to the front of the centre of the canonica, and before 1856 to the front of the duomo. A mask, taken after death, is deposited in the Academy of Fine Arts.

His works were important, but not numerous. Having been educated as a goldsmith, no long time elapsed before he was considered to be an excellent sculptor, as testified by the circumstances of the competition 1401 for the two doors of the church of S. Giovanni. The commission for them having been given to L. di Cione Ghiberti partly through the praise bestowed by Filippo, the latter sold his property at Settignano, and proceeded to study the architectural antiquities at Rome. He had previously, however, been engaged in various works in and near Florence, e.g. at the house of his kinsman Apollonio Lapi at the corner of the street of the Cini (according to VASARI, but of the Ricci as stated by the anonymous author herein followed by BOLDINUCCI); the arrangement of the rooms required for business by the officers of the Monte in the palace of the Signoria, where VASARI notes that he designed the windows and doorways "after the manner of the ancients, a thing not then very frequently done"; and at the tower (which still remains) and villa of Petraja, lately a grand ducal villa, at Castello. To the same period, probably, belonged the wooden model of his design for the marble pulpit executed with bassi-rilievi by a certain maestro Lazzaro, at the expense of the Rucellai family, and now in the church of Sta. Maria Novella: and the design for the chapter-house, hereafter to be mentioned, at the monastery of Sta. Croce is dated 1400 by BROCCHI, *Vite de' Santi Fiorentini*, 4to., Florence, 1765. He returned 1407 from Rome to Florence, where he resumed practice as an architect, was much solicited for drawings and advice, and made a model of his design (which was approved) for the drum of the cupola to the church of Sta. Maria del Fiore. Although his biographers do not account for his occupation for the next dozen years, it is probable that he was executing that drum under supervision: he withdrew to Rome after 3 May 1417 and resided there for a few months, when he was summoned back to Florence to give his opinion as to the method of forming the cupola itself.

Even as the story is told by VASARI, Ghiberti was certainly consulted upon the design for the cupola, because 3 Oct. 1419 he was paid 300 lire for a model of his idea for it in competition with Brunellesco, for whose model 50 lire 15 soldi only were paid at the same time. It is curious that the periods of the meetings of the celebrated *junta* of architects to which the story of the egg refers (if not altogether fabulous) are not stated, but they must have been between the date last given and 16 April 1420, when Filippo, after having succeeded in vaulting without any framework, the Barbadori (also called Capponi) chapel in the church of Sta. Felicità, and the Ridolfi chapel (which was destroyed in modernizing the building) in that of S. Jacopo sopr' Arno, was appointed 'provisor' of the cupola (ROSSI, p. 11) which was commenced 1421. From a report dated 24 January 1425, it appears that the cupola had then been carried as high as the lowest range of poles left for the scaffolds of the workers in mosaic. From a document dated 4 February 1425, it would seem that VASARI must have followed a very erroneous authority when he says that in 1420 Filippo was made principal master of the works with an order to carry the cupola to the

height of twelve braccia, that his success might justify a similar appointment for the rest of the work: and also when he says that the wardens 13 August 1423 presented one hundred florins to Filippo, and voted a similar allowance for life to him: the document dated 4 February 1425 (given in ROSSI, p. 20), shows that Battista di Antonio was then *capo maestro* of the work, that Filippo was re-engaged for one year at an annual salary of a hundred gold florins from the first day of March following, and that Ghiberti was to receive a monthly salary of three gold florins for giving one entire hour every day in attendance at the works. The dome (FAMIN, pl. 84) was finished not 12 January 1434 (ROSSI, p. 10), but 31 August 1436. Ghiberti ends his second *commentario* (printed by CICOGNARA, *Storia della Scultura*, fol., Venice, 1818, ii, 107-8), with these remarkable words: "Disegnai nella faccia di Sta. Maria del Fiore nell'occhio di mezzo l'Assunzione di Nostra Donna, e disegnai li altri sono allato. Disegnai in detta chiesa molte finestre di vetro. Nella tribuna sono tre occhi disegnati di mia mano. Nell' uno come Cristo ne va in cielo; nell' altro quando adora nell' orto; il terzo quando è portato nel tempio. Poche cose si sono fatte d'importanza nella nostra terra non siano state disegnate e ordinate di mia mano. E specialmente nell' edificazione della tribuna furono concorrenti Filippo ed io 18 anni a un medesimo salario: tanto noi conducemmo detta tribuna. Faremo un trattato d'architettura e tratteremo di essa materia"; but no one seems to have sought in the promised essay (an unfinished manuscript marked xvii, 33, in the libreria Magliabechiana at Florence, and apparently written after 1444) for the explanation, which would be very interesting if it existed. The word '*tribuna*' evidently means the great cupola, because it is recorded under the date 1419 "che si era sul serrare la terza et ultima tribuna di Sta. Maria del Fiore", (ROSSI, p. 10); and because there are no '*occhi*' in the three tribunes which give the cruciform plan to the church.

Much discredit must attach to the account given of the quarrel between Ghiberti and Lapi by VASARI, who exhibits his hero as an astute man of business freeing himself from an enforced partnership with Ghiberti (which is putting the matter in a false light), rather than as a genius trammelled by the mediæval system of requiring a success in competition or an approbation of colleagues to stamp any novel design before the order for execution would be given. For examples it may be sufficient to mention, that the design submitted by Brunellesco for the *lantern* of the cupola was preferred 31 December 1436 to others submitted by L. Ghiberti, A. Manetti, B. Mazzei, and D. Stagnatoio (ROSSI, p. 12 and 29); and that his design submitted for the choir 26 November 1435 (? 1437) was preferred to one by (? Ghiberti) Nencio di Bartoluccio, but was to be altered in accordance with some points found in another proposed by Agnolo d'Arezzo (ROSSI, p. 39 and 59). It would appear that the first stone of the *lantern* was consecrated by S. Antonio and not laid until 1443 (1445 MORENI, p. 278 note), the last stone in 1456 (ROSSI, p. 11) or 1461 (MORENI).

The original design of these works was published by B. S. GRILLI, *Descr. e Studi di Sta. Maria*, fol., Florence, 1733, and re-engraved by NELLI, *Piante ed Alzati—di Sta. Maria*, fol., Florence, 1755; these illustrations were reproduced on a smaller scale with others in ROSSI. An arch in the sacristy of the canons, mentioned in the archives under the date 15 Oct. 1436, was the work of Brunellesco; five models by whom are still preserved at the cathedral. The histories of the work by B. Bandinelli to the choir (an error as above shown) and on the gallery of the dome, are given by VASARI, i, 446, iii, 461-6, iv, 273-80.

His other works are not numerous. At Florence he designed about 1400 the chapter-house added at the expense of the Pazzi family to the church of Sta. Croce, and also 1420 the Pazzi chapel in the second cloister to that church, given in GRANDJEAN and FAMIN, *Archit. Toscane*, fol., Paris, 1836, pl. 11-13. He has the credit of rebuilding the church of S. Lorenzo (also

known as the basilica Ambrosiana, having been formerly dedicated to S. Ambrogio), the first stone being laid 1425; but the truth seems to be that, besides the *sagrestia vecchia*, which was his work, only two chapels were executed by him: he apparently made a design for the whole edifice, which was continued differently to the intention of Filippo by A. Manetti (GAYE, i, 167). A design for the façade by M. A. Buonarroti, who constructed the *sagrestia nuova*, is still extant. He also designed the house and loggia of the spedale di Sta. Maria degli Innocenti (1421), in the piazza dell' Annunziata, on the right hand of a spectator of the church of Sta. Maria dell' Annunziata, where more vaulting without framing was executed under his direction and the inspection of F. della Luna; it was opened 24 January 1444, and its chapel was repaired 1786; FAMIN, pl. 66. For the Scolari family he designed the church degli Angeli, never completed: drawings of this building are given in BONTI, *Memorie*, Rome, 1786, ii, 57, copied by others, as by SEROUX D'AGINCOURT, *History of Art*, fol., Lond., 1847 (Arch.), pl. 50, fig. 16; but they are not supposed to represent truly the intentions of Brunellesco. The palazzo del Comunità, commenced by F. della Luna and afterwards put into the hands of Brunellesco, as a place of meeting for the heads of the Guelphic party, has been partly appropriated ever since 1557 to the purposes of the Monte. He designed about 1434-40 for Luca Pitti the celebrated palace which he completed to the second range of windows with the assistance of L. Fancelli; on the loss of his model the structure was continued by B. Ammannato: details are in RUGGERI, *Studio*, fol., Flor., 1755, iii, 1; FAMIN, pl. 2. His model for a palace to be built for Cosmo de' Medici, in the piazza opposite to the church of S. Lorenzo, was destroyed by Filippo because his patron declined to execute the work from a fear of the envy it might create. He likewise prepared a design for a palazzo Barbadori, which was not executed; and another for a palazzo Giuntini, afterwards incorporated, as is believed, with the palazzo (Geri since) Martellini, in the piazza d'Ognissanti: in the same piazza he erected, to receive two families, the palazzo Busini, afterwards Gondi, and since Quaratesi. The villa designed by him for Luca Pitti at Rusciano, outside the porta di S. Niccolò, is still known as the villa Pitti, but better perhaps as the villa di Rusciano. It would appear that, between the years 1420 and 1425, Filippo was invited to Milan to construct the model of a fortress for the duke Filippo Maria Visconti: the model for the fortress at Vico Pisano was likewise prepared by Brunellesco; who at Pisa designed the old citadel; fortified the ponte a mare; and also gave for the new citadel the design whereby the bridge was closed by the two towers: he made the model for the fortifications of the harbour at Pesaro: and, returning to Milan, prepared designs of various works for the duke; and he appears under the date "circa 1430" in FRANCHETTI, *Storia del duomo*, 4to., Milan, 1821, as engaged on the works to the cathedral in that city. He was also employed as an engineer 1430 at Lucca, and 1445 at Mantua; and was at Rome 1431-3 for some purpose of the pontiff which have not been recorded by BOCCHI, *Bellezze di Firenze*, 8vo., Florence, 1591, p. 506.

The following works have been attributed, with more or less probability according to the dates, to Brunellesco. At Fiesole the badia di SS. Romolo e Bartolommeo, or Benedictine monastery transferred 1439-40 to the Canonici Lateranensi Regolari, for whom the elder Cosmo de' Medici built 1456-62 the present structure of the church (except the façade dating in the twelfth century) is supposed to have been designed by him although the work was done after his death. At Forlì the domed tribune called the cappella della Canonica in the cathedral is sometimes attributed to him, at others to Melozzo da Forlì; but it was designed 1490 by P. Bombacci according to MORONI, s.v. Forlì. At Peschia the oratory of SS. Pietro e Paolo, called the Madonna di Pis di Piazza is attributed to Filippo; but this according to GAYE was the work of his pupil and heir Andrea di Lazzaro Cavalcanti, of the Borgo a Buggiani in the val di Nie-

vole. At Florence the church of Sta. Maria Maddalena de' Pazzi a Porta Pinti (1410) said to have been commenced by Filippo, was completed by G. (Giamberti) da Sangallo; plan in FAMIN, pl. 65. The loggia (1451) of the hospital for convalescents, now the scuole di S. Paolo, in the piazza di Sta. Maria Novella; this work was restored 1789 with new columns by G. Salvetti; an elevation is in FAMIN, pl. 83. The palazzo di Filippo Strozzi in the piazza di Sta. Maria degli Ughi or delle Cipolle, which is clearly a design by Michelozzo. The monastery and church (1433-81) for the monks of S. Spirito: with regard to which it must be observed that while the monastery of S. Marco is said by VASARI, i, 503, to have been a work 1437-52 by Michelozzo, some chroniclers of the monastery affirm that the plan was due to Filippo, and merely the execution to Michelozzo; they also give 1443 (not 1452 as in VASARI) for the date of its completion; and VASARI himself, i, 26, attributes the church, which he calls the church of S. Spirito, to Brunellesco; a view of the interior is given in the *Illustrations*, s.v. Church-Interior: FAMIN, pl. 75-6, says it was completed 1470: and pl. 29, attributes to Filippo the palazzo Guadagni; with pl. 69-72 the palazzo Niccolini in the strada de' Servi: ANGUILLI, p. 211, mentions a torre di Brunelleschi.

Far more important than these, in the history of modern architecture, is the cappella di S. Spirito or dei Rucellai, about 1467, now separated by the arch being walled up, to the church (which was secularized 1808) of S. Pancrazio at Florence; the merit of which is attributed to Filippo as well as to Alberti, whose design it really was, and who herein followed the direction of the national taste to the restoration of antique art which about 1400-20 attested the influence of Filippo di Brunellesco Lapi.

In the notice of Cecca given by VASARI, that author considers that many of his machines and inventions for public and private pageants were additions to something similar, which had been previously constructed by Filippo, whose skill as a jeweller and goldsmith, as a sculptor, and as a mechanician, as well as in perspective and intarsiatura (CICOGNARA, *Storia*, ascribes to him the merit of all that is excellent in that art), VASARI carefully commemorates.

Besides (il Buggiano) Cavalcanti, his pupils or assistants were L. Panelli, F. della Luna, the latter being so bold and injudicious as to depart from the drawings given by his master; and perhaps one whom VASARI calls "a Schivonian", but who is supposed to have been Luciano MARTINI of Laurana. That Brunellesco "availed himself ever afterwards of the services of Cronaca" (S. Pollaiuolo), who lived 1455-1509, is a very remarkable error in VASARI iii, 8, as is evidenced by the dates.

BALDINUCCI, *Vita di F. di Ser Brunellesco, dell' editore D. Moreni*, 8vo., Flo., 1812; GAYE, *Carteggio Inedito*, 8vo., Flo., 1839, i, 114, 126, 145; ANGUILLI, *Notizie del Pal. de' Toscani*, 8vo., Pisa, 1815, p. 70, 211; ALLGEMEINE BAUZEITUNG, 1847, p. 187; and 1850, p. 307; MORENI, *Due Vite di Brunellesco*, 8vo., Florence, 1812; SCHORN, *Leben der ausgezeichnetsten Maler, etc.* (Vasari's Lives), 8vo., Tübingen, 1832-49; Rosso, *La Metropolitana Fiorentina Illustrata*, 4to., Florence, 1820. 73.

LAPICIDA. A term used early in the mediæval period, chiefly on the continent, for a mason who worked stone, but whether as a sculptor or carver, or simply as a mason, is not clear. The use of the term at Palma, with the date 1318, is given s.v. Fabra.

RUSKIN, *Stones of Venice*, 8vo., London, 1853, ii, 359, notices that "the twenty-first capital of the ducal palace at Venice (counting from the right to the left) represents the principal inferior professions. On the first side is an old man, with his brow deeply wrinkled, and very expressive features, beating in a kind of mortar with a hammer; inscribed *Lapicida sum*." Albertus lapicida "baumeister in Franken" erected the stiftskirche at Röhmbild in 1450; FIORILLO, *Deutschland*, 8vo., Hamburg, 1815, i, 247. CEMENTARIUS; LATOMUS; MASON.

LAPIDGE (EDWARD), F.I.B.A., was son of the gardener at Hampton Court palace. He exhibited at the Royal Academy of Arts in London, 1808 (then living at Hampton Wick) garden front of Esher place, Surrey, for John Spicer, Esq.; 1814, villa at Hildersham, in Cambridgeshire, for Thomas Fassett, Esq.; 1821, view from the lake in the grounds of C. N. Palmer, Esq. (M.P. for Surrey 1826) at Norbiton in Surrey; and interior of a dairy there; 1828, view of Kingston bridge; 1837, one of the four designs selected by the University of Cambridge for the Fitzwilliam museum; 1850, design for a bridge of suspension, upon a new principle of construction, whereby oscillation and undulation will be counteracted; and 1851, with his son S. . . ., design for the Cambridgeshire and Ely County Lunatic asylum. Among his other works are; 1825 November 7—1828 July 17, Kingston bridge, Surrey, at a cost of £26,800 and about £40,000 including approaches, etc.; it consists of five elliptic arches, the centre one being 60 ft. span with a versed sine of 19 ft.; the side arches 56 ft. and 52 ft. respectively; the total length is 382 ft., and width 25 ft. between the balustrades (INST. OF CIVIL ENGINEERS, *Proceedings*, 8vo., London, 1842, ii, 184-6; *Builder Journal*, xx, 603); 1827-29, S. Peter's church, Hammersmith, for 1,691 persons, at a cost of £12,223:8:4; 1832, S. Andrew's chapel, Ham common, Surrey, for 400 persons: 1836, submitted a design for the Houses of Parliament: 1836-7, alterations, etc., to nave and other parts of S. Mary's church, Putney, including the removal of bishop West's chapel to the north side of the chancel, at a cost of £4,000; rebuilding the chancel and vestry room, and restoration of the tower, at a cost of £1,614; making a total cost of £6,036: 1837-8, a new church at Ratcliff or Stepney for 1,022 persons at a cost of £4,000: 1839-40, All Saints church, Fulham, enlarged at a cost of £1,900: 1852, police station at Reigate for £1,535: and 1853, additions to the Surrey Sessions house, cost £4,900; probably in his capacity of surveyor of bridges and public works for the county of Surrey. He died early in March 1860. H. W. Russel, and G. Wightwick, are said to have been his pupils. Rear-admiral W. F. Lapidge was his brother, and died 17 July 1860, aged 67 (GENTLEMAN'S MAGAZINE, 3rd ser., ix, 324); BRAYLEY, *Surrey*, 4to., London, 1841, iii, 48, 111, 477.

LAPIS LAZULI, see LAZULI.

LAPIS SPECULARIS, see SPECULARIS.

LAPŌ (ARNOLFO DI), see CAMBIO (A. DI), and JACOPO.

LAPRANGA, see LASSA, and TESHU-H'LUMBU.

LAP WELDED TUBE. A wrought iron tube for the passage of steam or water under great pressure, in contradistinction to that for gas and water service, which is soldered or brazed, and only intended to resist light pressure.

A. A.

LAQUEAR and LAQUEARE (from Lat. *laques*, a net; or *laqueus*, a noose). A word supposed to be synonymous with lacunar in VIRGIL, *Aeneid*, i, 720, who says, "dependent lychni laquearibus aureis," where it might be suggested that the term was used for chains in net work; but SERVIUS commenting on this passage states, that laquearia, by which he is understood to mean coffered ceilings (this is supposed to be supported by the words "laqueata tecta" in CICERO, *De Leg.*, ii, and in HORACE, *Carm.*, ii, 16), were introduced into Rome from Carthage after the destruction of that city: this statement however is merely a note from PLINY, *H. N.*, xxxiii, 18, who says, "laquearia, quæ nunc et in privatis domibus auro teguntur, post Carthaginem inde transiere in cameras quoque et parietes, qui jam et ipsi tanquam vasa inaurantur," and because this author could not speak of *lacunaria* as "in parietes," it is evident that *laquearia* is not used by him as a synonym, but must mean something very different: what that something may be is perhaps undiscoverable; there does not seem to be any antique example of decoration, as chains or network, like the bands of the ceilings of the *grotte*, executed on walls in stucco for gilding. CAISSON; COPPER; LACE; LACUNAR; LACUNARIUM.

LARA (DON JOSEF DE) succeeded Don A. Garcia de Quin-

ones as conductor of the works of the plaza mayor at Salamanca, which he finished 1733.

66.

LARARIUM. A small room, in the inner part of a house, forming the sacellum or chapel in which the lares and penates, or household gods, were kept and worshipped (especially at rising) by religious Romans. In many of the Pompeian shops it is merely a small niche, which exactly resembling those in the shops at Naples in the present day, contain the image of a saint. In more important buildings they must have been of greater size, for LAMPRIDIUS, *Hist. Aug. Script.*, in vitâ, states that Alexander Severus had a lararium which not only contained statues of the principal deities (divos principes) but also those of Orpheus, Abraham, Christ, and Alexander the Great; and this he called the *lararium majus*; the *lararium minus* contained representations of distinguished men, including Achilles, Cicero, and Virgil.

A. A.

LARCH, see ABIES, and LARIX.

LARDER (It. *dispensa*, *guardaspensa*; Sp. *despensa*; Fr. *dépense*, *garde-manger*; Ger. *speise-gecölbe*, *speise-kammer*, *speise-schrank*). A place in a dwelling-house in which to keep various sorts of provisions; it must not be confounded with the PANTRY which originally was the bread store. A wet larder (called *acatry* so late as 1610, Harl. MS. 1857, p. 27) and a dry larder are mentioned as among the offices of Hengrave hall, Suffolk, finished 1538.

The meat or *wet* larder should be near the kitchen for keeping all uncooked meats, including poultry, game, and fish. In some cases it is built detached. In large establishments there may be a separate game, and even a fish, larder. It will probably contain the balance for weighing; a bacon rack suspended from the ceiling unless there be a 'bacon store', but more generally, iron bars with hooks sliding thereon, for hanging joints, game, etc.; a table, a chopping block, salting pans, a marble fish slab, a small refrigerator, a box sink, dressers and shelving as noticed below; and possibly places for vegetables and for fruit.

A *game* larder, if separated from the above, will require bearers and hooks overhead, and a slate or marble slab under a window, or on a centre table. A *fish* larder requires a broad slate or marble slab, and a few hooks above.

The *dry* larder is a small room close to the kitchen for keeping *cold* meats and whatever may accord with them. In ordinary cases it serves for bread, pastry, milk, butter, and such like articles. The aspect should be north and east, to secure coolness of temperature, freshness of ventilation, and dryness.

The windows of both larders, and perhaps also the door panels, should be filled with wire gauze or finely perforated zinc, to admit light and air, and to exclude flies and dust; the dry larder having also glazed casements to be shut in severe weather. An additional safe of wire gauze 3 or 4 ft. square for further security, and covers of that material for separate dishes, perhaps a centre table, and a refrigerator, a slate or marble slab 2½ ft. to 3 ft. wide, and two or three tiers of shelves about 18 ins. to 2 ft. wide, will be needed. The floors should be paved with a drain carefully trapped, for carrying off the water used in cleansing the room and fittings; and the walls be lined with tiles, or other non-absorbent material, for greater coolness. KERR, *Gentleman's House*, 8vo., London, 1865, p. 39, 215.

LARDOSE. An error in copying for LAORDOSE.

LARGENT (PIERRE) constructed 1370 the towers of the cathedral at Amiens; COMITÉ HISTORIQUE, etc., *Bulletin*, 8vo., Paris, 1842-3, p. 339.

L'ARGENTA. A name by which G. ALBOTTI was known.

LARI (ANTONIO MARI) was engaged 1542-46 by the signoria of Siena to make several reports for them, as detailed from the archives, by GAYE, *Carteggio Inedito*, 8vo., Florence, 1839, ii, 288, 312-21, 338-43, 352-5.

LA RICCIA, L'Ariceia, and Ariceia (the ancient Aricia).

A small town in the Papal States in Italy. It is situated one mile from ALBANO, and separated from it by a deep ravine, over which the road was carried by a viaduct erected 1846-53 by Cav. Bertolini for Pius IX. It consists of three superposed ranges of arches, 6, 12 and 18 in number, the height of each being 52 ft. 6 ins., the width 39 ft. 4 ins. between the upper piers, and the length 1,056 ft. including the approaches: the greatest height is 196 ft. 10 ins.: the width between the parapets is 28 ft. 3 ins.: it is executed in peperino stone, and cost £30,000; the ALLGEMEINE BAUZEITUNG, ser. 2, 1852, pl. 476, gives an elevation of it, from which the above dimensions are taken.

FALDA, *Il Nuovo teatro*, fol., Rome (1669), ii, pl. 13, gives a view of the town; pl. 14 the circular church of the Assumption, built 1664 by G. L. Bernini for Alexander VII, the stuccoes of the cupola are by A. Raggi; the piazza and the fountains, with the palazzo Agostino Chigi, 1664, also by Bernini; pl. 15 view of the interior of the church; pl. 16 the church della Miracolosa Madonna, and pl. 17 the interior view of it. These are the most noteworthy buildings in the town, which is formed on the site of the old citadel on the summit of the hill.

Among the ruins of the ancient city on the southern slope of the hill are the city walls, and a highly curious fragment with an upright aperture, through which water flows, and is supposed to be the emissary of the lake of Nemi or the fountain of Diana. Nibby discovered here the temple to Diana, which is the most important of the ruins. In the valley is the causeway 700 ft. long, about 40 ft. wide and 40 ft. high in the deepest part, by which the via Appia was carried; it is built of quadrilateral blocks of peperino, and is pierced by three arched apertures as culverts for the water. 28.

LARIX. The larch; in addition to the notes given s. v. ABIES, the following observations may be useful.

The *Larix Americana*, American larch (Fr. *Epinette rouge*), is superior to any species of pine or spruce, uniting all the properties which distinguish the European species, being exceedingly strong and singularly durable. In Canada it is considered among the most valuable timber, and has no fault except its weight. It is justly appreciated in the United States, but it is little employed because it is rare, and may be replaced by several resinous trees which are cheaper and more abundant; MICHAUX, *North. Amer. Sylva*, 8vo., Phil., 1817-9, iii, 215. This tree, the black larch, supplies the wood called "tamarac" by the Dutch, and "hacmantac" or "hacmatac" by the Indians, under which last name it is commonly known in England. SLEIGHT, *Pine Forests*, etc., 8vo., London, 1853, pref. v, remarks that, "Botanists state that the hacmatac grows in profusion in the North-eastern States and British America; but it prevails to an even greater extent in New Brunswick, Nova Scotia, and Prince Edward Island. It is frequently used in ship-building of colonial vessels, as it is a wood, hard, strong, and very durable, while the houses of the settlers are almost entirely constructed of it. It is not so easily ignited as most of the pine tribe, but when once blazing, it burns with great briskness, giving out a fervent heat; it is therefore in great request for steam-boats and engines, in Canada and the States. It is the most durable wood to be found in British North America, equalling English oak or the far-famed teak. There is no record of a vessel built of hacmatac having been destroyed by dry rot; whilst, in several cases, the oak, and other timber surrounding and immediately contiguous to it, has been found decayed. LINNÆUS states that specimens have been found more than four hundred years old. Painters, from the time of Pliny to that of Raphael, trusted their works to this wood, which the Roman naturalist styled 'immortale lignum.' The Romans, when first acquainted with the larch, lost no time in bringing it down from the Alps. PLINY says, 'This tree is the best of the kind that bears resin; it rots not, but endures a long time.' And this assertion of PLINY is well borne out by the fact, that the immense floating palace, or

ship, built of cypress and larch by the emperor Trajan, as a summer residence on lake Nemi, having been weighed up, the timber was found sound after fourteen hundred years' immersion."

VITRUVIUS, ii, 9, considered the larch not subject to rot or attack of the worm, and good stuff for projecting eaves because it could only be consumed by other wood, and did not emit flame or yield charcoal. His commentator Philander found that it produced flame and charcoal, as might have been expected. PLINY, *H. N.*, xvi, 74 and 76, states that Nero's amphitheatre in the Campus Martius had a beam of *larix* 120 ft. long and 2 ft. wide, which was carried from Rhætia by order of Tiberius, when that emperor caused the bridge of the Naumachia to be rebuilt of larch planks, and was shown and preserved long after as a rarity. PLINY also states that, later, another log was shown, 100 ft. long and 18 ins. wide. 2.

Larch wood is very firm, close in the grain, and in the carpenter's phrase, very horny. It is also free from large knots, and the dead ones are generally sound and fast wedged. In timber constructions it is applicable in large baulks as beams or lintels, but when cut into deals and such like scantlings, its tendency to warp and twist is very great: if barked two years before cutting down, it is said to be freed from this tendency. The hacmatac, according to Hartig, weighs 60 lbs. 13 oz. per foot super. when green, and 36 lbs. 6 oz. when dry. Its strength compared to that of oak is as 103 to 100; its stiffness as 79 to 100; and its toughness as 134 to 100. In a good soil the colour is a yellowish white, but in a poor soil at great elevations a reddish brown and very hard. It is used for handrails, and the fittings of ships that require toughness and hardness; also largely for sleepers for railway purposes as in the Trent Valley railway, and in analogous works; its durability in situations alternately wet and dry is very great. The trees rarely exceed beyond 70 ft. in height, and do not attain great bulk; sticks about 40 ft. long and 1 ft. square can be furnished, but they do not grow in localities that admit of their being easily conveyed to market. The hacmatac of Upper Canada is said to weigh only about 24 lbs. per cubic foot.

Larix Europæa is described by PARKINSON, *Paradisus*, fol., London, 1629 (1656, p. 608), being then extremely rare in England. This species is said to weigh about 35 lbs. per cubic foot, while the larch of Scotland weighs only 29 lbs. 4 oz. The larch or *alerce* of Spain is the THUYA. 71.

Since 1725 or 1727 the larch has been naturalised in Scotland, and forms one of the most valuable and extensively cultivated timber trees in that country. A specimen of larch from the Rt. Hon. T. F. Kennedy's estate, near Maybole, in Scotland, was exhibited at the Horticultural Society, 21 March 1854, to show how different from, and inferior to, American larch or hacmatac, is British grown wood of this sort: it was a block of a tree about 2 ft. in diameter; *ATHENÆUM Journal*, 1854, p. 377. The question is raised in *NOTES AND QUERIES Journal*, ser. 1, 1852, vi, 350, whether the larch will always fail except on the primitive rock formations, as noted by Lord Portman in the *Quarterly Journal of Agriculture*.

It is stated that fir posts for fences last longest when peeled, that is, all the bark removed; the largest end should be placed in the ground, with stones, not earth around it: *BUILDER Journal*, 1861, xix, 132, 273: the great durability is set forth in ix, 249; and especially of trees from 70 to 80 years' growth, in xv, 328 of the same work. Nearly all the timbers of the old Venetian buildings are said to be of larch: and in mines larch is generally used for shoring to the galleries.

A useful paper on the larch and its disease called 'heart rot', considered due to a too great dryness of the soil where it occurs, was given in the *GARDENERS' CHRONICLE* of 1848, and copied into the *CIVIL ENGINEER*, etc., *Journal*, February 1848, xi, 63-4. MURRAY (duke of Atholl), *Observations on the Larch*, 8vo., London, 1819; PENNY MAGAZINE, *On the Economical uses of the Larch*, 8vo., London, 1843, xii, 226;

M'INTOSH, *The Larch Disease*, etc., 8vo., London, 1860, which disputes the great value of the tree (*BUILDER Journal*, xv, 302); MONTEATH, *Foresters' Guide*, 8vo., Edinburgh, 1824, p. 235; TREDGOLD, *Carpentry*, 4to., London, 1853, 4th edit., by BARLOW, p. 279-82; NEWLAND, *Carpenter's, etc., Assistant*, 4to., London, 1860, p. 119.

LARKE (THOMAS), "surveyor of the kynge's workes", is mentioned in the indenture dated in the fourth year of Henry VIII (1512-3) for raising the vault of King's College chapel at Cambridge; and in another dated 4 August of the following year, for vaulting the chapels and porches, and for other works there: in another for other works; while in those dated 30 April and 3 May, eighteenth year (1526-7) for the painted glass, he is called "clerke, archdeacon of Norwyche", to which dignity he had been collated 9 April 1522, and resigned it in or before June 1523; he became master of Trinity hall in 1517; COOPER (C. H.), *Athenæ Cantabrigienses*, 8vo., Camb., 1858, i, 38; BRITTON, *Arch. Antig.*, 4to., London, 1807, i; WALPOLE, *Anecdotes*, 8vo., London, 1862, p. 106-7, and appendix.

LARMIER, corruptly LORIMER. The corona of the cornice in the Classic and Italian styles. The mediæval term *ressaut lorymer* for an oggee form of molding with an edge so deeply undercut as to form a drip or *larmiere* to conduct water, is supposed to be derived from this term; DALLAWAY, *Discourses*, 8vo., London, 1833, p. 174. The Dutch render this molding *dropsteen*, and some of the early writers have 'drop-stone'; hence probably T. Rickman took his term DRIPSTONE. THROVING. 16. 25.

A molding of double convexity in place of the *larmier* or corona, found in the theatre at Arles, is given in BLAVIGNAC, *Hist. de l'Arch. Sacrée*, 8vo., London, 1853, p. 13, pl. x*, fig. 7.

LARRAZA (TOMAS), succeeded 1714 L. de Longa in the construction of the parish church at Elgoibar, in the province of Guipuzcoa. He executed the arches of the choir and the seats (*graderia*) of the presbytery, laid the foundations for the tower and built it to a height of twenty-one *hiladas* (courses of bricks or stones). He died 1738, and was succeeded by I. de Ibero. 66.

LARREA (PEDRO DE), maestro mayor of the works, conducted 1514 the building of the convent church at Alcantara: as it was begun 1506, LLAGUNA thinks that he designed it. In 1515 he was invited by royal letters to Madrid for the purpose of designing the convent of S. Marcos de Leon, but it is not clear that he went there. 66.

LARRENAGA (JUAN HIERONIMO), directed from 1634 to 1643 the construction of the church at Chelva, in the province of Valencia. He died either in 1643 or 1644. 66.

LARRY. A kind of long handled iron hoe with holes in it, used by bricklayers in making mortar; and to rake backwards and forwards the mortar laid on walls when mixing it with water to form grout.

LARRY or LORRY, in engineering, is the term for a small truck on four low wheels, used by workmen on railways, and propelled by their feet or by a handspike. w. t.

LARTIGUE (. . .), father and son, of Bordeaux, were professors of architecture at the old academy of painting, sculpture, and architecture in that city. The first designed for the archbishop de Rohan a new entrance to the cathedral; which is given to a large scale in *Prospectus d'un portail d'église gothique pour la cathédrale de S. André*, pamph., 1776. He assisted — Chevet in the construction of the porte Bourgogne. The son suggested the necessity and the means of transferring to a more convenient place the old hospital of S. André, explained in *Projet d'un nouvel hôtel Dieu à Bordeaux*, 1782. Their deaths are not recorded in BERNADU, *Viographie Bordelais*, 8vo., Bordeaux, 1844, pp. 340, 353.

LARWICK (probably Laurvig in Norway, as s. v. Baltic timber) DEAL BOARDS and FIR TIMBER were used at Whitehall in 1660; Harl. MS. 1656, p. 33.

LASARTE (DOMINGO DE) was 1538, on the recommendation

of R. Gil de Hontañon, maestro mayor of the works, appointed by the chapter of the cathedral at Salamanca, as *aparejador* of the building; but owing to the frequent absences of the maestro, it seems that he directed and conducted almost everything by himself till 1572, when he died. 66.

LASCHENSKY (JOHANN GEORG), baumeister, born 29 July 1760 at Vienna, was practising 1810 at Salzburg. 26.

LASSA, *L'hasa*, *Lha-Ssa*, and *H' Lassa*. The capital of the territory of the Dalai-Lama, or ruler of the eastern part of Tibet or Eastern Tibet, and situated near the junction of the rivers Dzang-su and Dzang-bo. As this city is the seat of the Buddhist religion, all the public edifices worthy of notice are connected therewith and with the monasteries, of which there are more than thirty large ones in the district. One of them, situated in the heart of the city, is remarkable for its splendour and wealth; in the outskirts are four others, said to contain about 15,000 lamas, or priests and students. About a mile and a-half to the north-west is the Botala or Buddhala, the residence of the grand lama, upon a triple peaked oval hill, said by some authors to be 367 ft. high, though others give that height to the residence (otherwise said to be of four stories), called the "Lapanga", on the top of it, containing some 10,000 apartments and a large dome, one of five, which like the peristyle surrounding the structure, is covered with gilding; the interior is said to surpass in wealth Mecca and Medina. The accounts of the whole place are of so meagre a character, that only a few further details will be found in the following works. RITTER, *Asien, Erdkunde*, etc., 8vo., Berlin, 1822, etc., iv, 243; HUC, *Souvenirs d'un Voyage*, etc., 8vo., Paris, 1850; its translation by Hazlitt, 8vo., London, 1851, ii, p. 137, 219; GUTZLAVF, a paper read 1849 and given in the *Journal of the Royal Geographical Society*, 8vo., Lond., 1851, xx, p. 214-7. 14. 50.

LASSAULX (JOHANN CLAUDIUS VON), was born 27 March 1781 at Koblenz. He studied in the university at Würzburg; and after having tried several branches of mechanical, as well as industrial, businesses, adopted architecture. He was appointed 1812 *landbaumeister* at Koblenz; 1816 *landbauinspector*; and as such, was commissioned to build twelve Catholic churches in the environs of that town. The nine most important, viz., at Boos, 1833-40 Güls (*Bausteine*, pl. 5), Capellen, Cobern, Walwig, Waldesch (all in pl. 6), Weisenthurn (pl. 8), and Vallender (pl. 7), show that simultaneously with the construction 1824-30 of one of the larger churches at Treis in the Gothic style (*Bausteine*, pl. 4), he tried before other architects to introduce the Romanesque style of vaulting in the construction of the smaller ones, as at Valwig. He restored the church of S. Florin in a mediæval style; and 1830 the church of S. Castor, both at Koblenz: repaired the chapel of S. Mathias in the castle at Koblenz; designed a Gothic altar in the chapel of the Burgess' hospital; built the *interims-caserne* (barracks), and his own house, besides more than sixty private and public buildings; all at or near Koblenz: the burg or castle at Rheineck: 1846-7 removed the chapel of Ramersdorf to the cemetery at Bonn, (given in *Bausteine*, pl. 3); and restored the königsthiel near Rhense (pl. 9). He was created *bauinspector* by the king of Prussia: and elected hon. and corr. member of the Royal Institute of British Architects; and of the Comité royal des arts et monuments, in Paris.

Among the most important of his publications are: *Treatise on the Arches as used by the Ancients*, printed in the *JOURNAL FÜR BAUKUNST*, edited by CRELLE, i, pt. 4, translated in the *QUARTERLY JOURNAL* of the Royal Institution, 8vo., London, 1831, and into French in the *Journal du Génie Civil*, Paris, 1831; *Beschreibung eines sehr einfachen mittels den übeln geruch der abritze zu beseitigen, und nachricht von einer verbesserung der eisernen stubenöfen, so wie einiges über enge schornsteinröhren*, pamph., 12mo., Cologne, 1836; *Beschreibung einer neuen Art Mosaik aus Backsteinen*, pamph., 8vo., Coblenz, 1839; *Bausteine* [on the construction of churches,

with especial reference to a mode rediscovered by him of forming light vaults by hand (*aus freier hand*) by supporting ribs (*gräten*), to avoid the necessity for buttresses, and admit of the use of thin walls; see also WHEWELL, p. 149], 4to., Cobl., 1847; with DRONKE, *Matthias Kapelle auf der oberen Burg bei Koblenz an der Mosel*, 8vo., Cobl., 1837; with KLEIN, *Rheinreise von Strassburg bis Rotterdam: Mit architektonisch-historischen bemerkungen über die Bauwerke am Rhein*, 12mo., Cobl., n.d.; 2nd edit., 1835, which has been translated and inserted in WHEWELL, *Architectural Notes on German Churches*, 8vo., London, 1842, 3rd edit., p. 147-226, including LASSAUX's list of the *Areas of many churches*, given also in the *Bausteine*. He likewise contributed to many periodicals notices on architectural matters, especially the KÖLLNER DOMBLATT, the BERLINER ALLGEMEINE ZEITUNG; and to the Royal Institute of British Architects. He died at Coblenz, 14 October or 23 November 1848. COTTA, *Kunstblatt*, 1848, p. 256; KUGLER, *Kleine Schriften*; NEUER NECROLOG DER DEUTSCHEN, 8vo., Weimar, 1848, ii, 655. 68. 116.

LASSO (GIULIO), of Rome, designed 1609-20 by order of the Spanish viceroy the duke of Villena, the four segmental façades of the piazza Vigliena, or I quattro Cantoni, at Palermo, which are decorated with three tiers of statues, comprising the seasons, kings of Spain and Sicily, and saints of the city; GALLO, *Elogio Storico di P. Novelli*, 4to., Palermo, 1830, p. 49; GALLY KNIGHT, *Normans in Sicily*, 8vo., Lond., 1838, p. 228.

LASSURANCE (. . .) see CAILLETEAU (. . .).

LASSUS (JEAN BAPTISTE ADOLPHE), was born 19 March 1807 in Paris, and entered 1828 the école des Beaux Arts. In 1833 he first exhibited the plans of the Tuileries such as they have risen out of the brains of P. de Lorme; and next turning his attention solely to the edifices of the Pointed style in France, he became an opponent of eclecticism and a devoted mediævalist. In 1835 he made a design for the restoration of the Sainte Chapelle at Paris; up to 1837 he restored the refectory of the priory of S. Martin des Champs adapting it for the library of the Conservatoire des Arts et Métiers. Also in 1837 he was nominated, conjointly with Greuterin, architect to the church of S. Severin, to which building he added the gate of S. Pierre aux Bœufs on the west façade. In 1838 he presided over the restoration of the church of S. Germain l'Auxerrois, first under E. H. Godde (died about 1854), and then independently. About the same time he commenced the works at the Sainte Chapelle, which 1849 were left completely in his hands; and he was engaged with Viollet-le-duc in similar restorations at the cathedral of Notre Dame. During these works he formed a Gothic school of sculptors, glass painters, smiths, decorators, and workers in wood; or, as stated in the words of DARCEL, then "commenced the restoration of the altars, the lattice work, and the stalls really inspired by the models of the Middle Ages; then were painted on the walls either legendary tales connected with the history and tradition of the structure, or ornaments, or decorations—an expedient resorted to now over the whole of Europe: the first *vitrail légendaire*, after patterns of the thirteenth century, were done for this (the S. Germain) building."

In 1843 he designed the church of S. Nicolas at Nantes; 1848 the nave to the cathedral at Moulins, of which only the choir had previously existed; the church at Belleville; and some other works. In 1850 he obtained the cross of the Legion of Honour; and 1855 the third prize in the competition for the new cathedral at Lille. The *MONITEUR DES ARCHITECTES Journal*, xiii, 4to., Paris, 1852, gives pl. 145-56, plans, etc., of the house for prince S . . . , Avenue Montaigne, No. 24; also in LALANDE, *Recueil des Maisons Modernes*, fol., Paris, 1858, pl. 30 to 41; who pl. 4 and 5, gives the entrance and vestibule of No. 1 rue de Houssaye. He died 11 (BUILDING NEWS *Journal* states 15) July 1857 at Vichy, whither he had gone for the benefit of his health. DARCEL in BUILDER

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Journal, xv, 486; and WILLIS, *Fac-simile*, etc., 1859. His portrait is given in the *Album de V. de H.*, 4to., 1858 and 1859, mentioned below.

His literary productions, which were many, comprise:—with DIDRON and DUVAL, *Monographies de la cath. de Chartres: Arch., Sculp., d'Ornement, et Peinture sur verre*, fol., Paris, 1842-56; *Réaction de l'Académie des Beaux Arts contre l'art Gothique*, 8vo., Paris, 1846; the essay *L'architecture religieuse et civile*, for LACROIX, SERÉ, et DUCHESNE, *Le Moyen Age et la renaissance*, 4to., Paris, 1848-51, v; with HUCHER, *Etudes sur l'histoire et les monuments du département de la Sarthe*, etc., 8vo., Paris (1856); with GUILHERMY, *La Sainte Chapelle de Paris après la restauration terminée par M. L.*, etc., fol., Paris, 1857; and edited with QUICHERAT, *Album de Villard de Honnecourt*, annoté, etc., 4to., Paris, 1858, with an Essay; which was translated into English by WILLIS, *Fac-simile of the Sketch Book*, etc., 4to., London, 1859.

LASTRICATION. A word which may be derived from the It. *lustricare*, meaning to line with marbles, etc. s. s.

LAT or LATH. The oldest and simplest forms of a TOPPE, or sacred memorial connected with the Buddhist religion, were single pillars (*sthambas*), either carved out of one stone or regularly built, the former being distinguished as *lâts*. The oldest monuments hitherto discovered in India are a group of these monoliths set up by Asoka (250-200 B.C.). They are all alike in form and all bore the same inscription; namely four short edicts containing the creed and principal doctrines of Buddhism, which he had recently embraced. The key to the inscription was discovered 1837 by J. Prinsep, secretary to the Asiatic Society of Bengal; a full account of that at Delhi is given in the *Journal* of that society, vii. A *lât* is said to exist at Benares. A monolith at Jampore has an inscription in the same character as that on Feroose shah's *lât* at Delhi; OLIPHANT, *Katmandu*, 8vo., London, 1852, p. 24. A list of early inscriptions, etc., is given in ROYAL ASIATIC SOCIETY, *Journal*, 8vo., London, vi, 469-74.

Of these pillars, one was re-erected at Delhi, by Feroose shah on the terrace of the principal building or Barah Durri, as a monument of his victory over the Hindus, he having removed it from some vihara in the vicinity: three more stand near the river Gunduck in Tirhoot: another has recently been placed on a pedestal in the fort at Allahabad: a fragment of another was discovered near Delhi: and part of a seventh was used as a roller on the Benares road by a Company's engineer officer. In a communication to the Asiatic Society, Capt. M. Kittoe stated that he had discovered another at Bukrowe, the site of an ancient city of the Buddhists on the banks of the Lilajun; BUILDER *Journal*, 1847, v, 127.

The *lât* at Allahabad is figured in FERGUSON, *Handbook*, 8vo., London, 1855, i, 7, as 42 ft. 7 ins. high, of which the probable base was 7 ft. 7 ins., where the shaft is 3 ft. in diam., diminishing to 2 ft. 2 ins. at the summit; "the necking immediately below the capping represents, with considerable purity, the honeysuckle ornament of the Assyrians, which the Greeks borrowed from them with the Ionic order", and the bead and reel ornament; it is also figured in LAYARD, *Nineveh*, etc., 8vo., London, 1849, ii, 295. The capital is lost, but two of the examples (at Kessereah) in Tirhoot still retain the lions which seem to have crowned the summit of all; "the capitals are so similar to the lower members of those at Persepolis, and more especially to the bases of the columns there, as to leave no doubt of their common origin"; one is also figured by FERGUSON, p. 7; or *History*, 1867, ii, 459. It is almost certain that the *lâts* of Asoka stood originally in front of some sacred building which has perished. MINAH.

LATAKIA, in Syria, see LAODICEIA AD MARE.

LATAMUS, properly LATOMUS.

LATAPIE (JEAN), born 1784 at Jurançon, in France, became a pupil of C. Percier. He resided at Pau, where in 1816 he rectified the projected design for the *place* de Grammont;

projected 1817 a prison; designed 1822 a (frontier) *lazaretto de terre* at Urdos (Basses Pyrénées), 120 mètres by 400; 1823 the maritime lazaretto at Bayonne, 120 mètres by 400; 1825 projected with A. Famin the church of S. Louis at Pau, in which city he restored the hôtel de ville; designed the market, the *halle*, the public granary, 47 mètres by 67, and 1827 a bathing establishment, 30 mètres. In 1829 he also designed an hôtel de ville and a *halle* for the town of Nay; and projected a theatre, and "vauxhall" for Pau; with other works. He was living in 1831, at which time he was architect of the town and of the château at Pau. 110.

LATCH (Lat. *obez, vectis*; Ital. *saliscinio*; Fr. *loquet*; Ger. *klinke*; Sp. *aldaba*). A fastening by which a door may be opened and shut by a handle, in contradistinction to a *lock*, which can only be opened by a key. Latches may be classified as *lifting latches*, that is where a thin piece of wood or metal is lifted out of a notch made in another projecting piece; and *bolt latches*, which resemble locks, but open by a handle instead of a key. The lifting latch is often made with a flush plate, and the lever is raised by thrusting a stud inwards; this sort is much used for stables, and it is sometimes called a *Suffolk latch*, probably in contradistinction to the term *Norfolk latch*. It is very convenient, as no part of it can catch the harness of horses or hurt them in passing in or out. The *loose box latch* is a large strong latch with a spring on the upper part. The *locking latch* has a moveable stop, which may be put aside to enable the latch to be lifted. The simplest latch is a piece of thin wood turning on a nail or screw, secured to the door by a cleet or square staple, falling into a notch or hook (which two last serve as a *keep and catch*), and lifted by a piece of string passing through the door, or by means of a hole through which the finger may be passed. Next to this is the *thumb latch*, which is generally stamped out of wrought iron, and of rough construction. A lever passes through the door under the latch, at the other end of which is a hollow, which the thumb can press so as to raise the latch by means of the lever, from which circumstance the name 'thumb latch' is derived. A better and more finished construction of the kind is called a *Norfolk thumb latch*; this is generally of cast iron and lacquered; better still is the *brass thumb latch*, but from its expense it is now seldom used. All latches of this description have a *keep and catch*. **KEEP.**

Latches for buildings in the mediæval style are much used instead of drawback locks; these are generally of wrought iron with keeps and catches, and opened by twisted ring handles on ornamental cut escutcheons, and the ring generally is made to fall on the head of a large nail, so that it answers for a knocker as well as a ring handle.

A variety of other latches are found in the ironmonger's catalogues and classed as *square latches*: they are mostly of brass. These may be classed as *rim*, *plate*, or *mortice* latches. The two former being fixed on the front of the styles of the doors; the latter, as its name imports, being morticed into its edge. The *bow latch* is a plate screwed on to the face of the door with an ordinary latch, keep and catch, but generally with a spring over the latch, all of which show in the room; some have a drop ring handle. Another sort, instead of a lifting latch, has a small bolt bevelled, where it strikes the catch on the door jamb. These are much used for water-closets, cupboards, etc., and sometimes have a flush plate bolt in them to secure the door inside, and are let into the side of the door style, not morticed. A better sort is called a *pulpit latch*. Both these varieties are sometimes made on the principle of a *rim lock*, and sometimes of a *mortice lock*, either plain or *rebated*, and are of the same description as the locks respectively named, but without wards, locking bolts, keys, and escutcheons, and of course are much smaller in consequence. Most of these varieties, however, have private bolts. They have similar handles and spindles, and are also fixed like rim and mortice locks, etc., etc.

In country work to gates, the latch generally is of wrought iron with a twisted monkey tail end, so that it may be caught with the hook of a whip or stick. If hung to open both ways, as *hunting gates*, the catch is bevelled both ways with a notch in the middle. There are very many sorts of patent latches; those of Hobbs' and Chubb are the most used. The 'Needle door-latch' as it is called, is one of the last novelties of the *lock* kind.

A. A.

LATCH BAR. A flat bar of iron, one of the best methods of fastening doors or shutters, it having one end split for four inches or more, the piece being made to work as a latch. The latch being raised up, the bar is first run into a slot in the jamb at the same end, then run home in a similar slot in the jamb at the other end, as far as a shoulder on the bar will permit; on the latch being pushed down, the bar cannot be moved until the latch is again raised. Each slot is formed in a plate of metal secured on the face of the jamb or of the shutter box.

LATERAL STRENGTH. The resistance which a body will offer at right angles to its grain. It is a term occasionally used in describing the strength of a material, as a beam when tested by a weight suspended from the middle of its length, both the ends being supported; or by a weight suspended from one end when the beam projects like an arm. The proper term is **TRANSVERSE STRAIN**.

LATERITE. The name given by BUCHANAN, *Mysore*, 4to., London, 1807, ii, 440, to an indurated iron clay (a contemporaneous rock associating with trap) found over the granite, and peculiar to the western coast of India where it is met, in immense masses without stratification, from close by Bombay and Ceylon (where it is called *kabuk*) for the most part up to the very foot of the ghauts. It is found in detached beds along the Coromandel coast, near Madras and Nellore, Rajahmundry and Samulcottah, extending into Cuttack; it caps the loftiest summits of the eastern and western ghauts, and some of the isolated peaks in the table land in the interior. It is found also on the shores of Sumatra and the straits of Malacca. Its colour is of a red iron or brick-dust hue, sometimes deepening into a dark red, marked with whitish stains. It is occasionally cellular or perforated with tubiform holes. When raised it is easily cut, but quickly hardens; it darkens in hue by exposure to the air, but is very little liable to atmospheric influence; *Builder Journal*, 1850, viii, 386. In some of the native dialects it is called *Itica culla*, and in the Tamil language *Shuri-cull* or itch stone. The arcades, inquisition, and the churches at Goa, are built with "the coarse laterite rock on which they stand, and necessarily covered with plaster—also with three centuries of white and yellow wash", FERGUSON, *Handbook*, 1862, iii, 410. The old fortress at Malacca is another example of its use. FERGUSON, *Rock Cut Temples*, 8vo., London, 1845, p. 41, notices that the hill of Dhumnar, about forty miles south-east from Neemuch, consists of laterite, very similar to that of Cuttack, but of a coarser grain than usual: and in *Pict. Illustr.*, fol., London, 1847, p. 30, illustrating pl. 4, the temple of Kapila Devi at Bobaneswar, dating about the twelfth or thirteenth centuries, he states that laterite is "a hard, coarse, iron clay stone which admits of no fine details, gives no clue to the age of the structure." ASIATIC RESEARCHES, 4to., Calcutta, 1833, p. 4. KANARA.

LATH (Lat. *assula, lata*; Ital. *assivella*; Span. *lata*; Fr. *latte*; Ger. *latte*). A slip of wood used for various purposes in building, namely, for hanging tiles and slates, and to form a ground for plastering; they differ in size according to the weights they may have to bear, or the object to which they may be applied. By the statute Edward III, a heart of oak lath was to be 1 in. wide and $\frac{1}{2}$ in. thick, but in practice it became reduced in thickness to a bare quarter of an inch. The Assize of Bread (1528?) declares that "the lath shall conteyne in length v fote, and in brede ii ynches, and in thyckenes halfe a ynche of assyse upon payne for every c lathe put to sale to the contrarye, *iid.*" Heart laths and beech laths for carrying

reeds, are mentioned 1332, and great and sap laths 1365-6, in BRAYLEY and BRITTON, *Palace*, 8vo., Lond., 1836, p. 155; 190.

Pan tile laths.—Slips cut out of good yellow deal varying from 1½ in. wide, and 1 in. thick (the old sizes), to 1¼ in. or 1 in. cut out of ¾ in. stuff. They are nailed to the common rafters, and the pan tiles are suspended to them by a knob on the head of the tile constructed for that purpose. They were formerly and are still sold in bundles of 12; if out of a 10 ft. deal—120 ft. run; or if out of a 12 ft. deal—144 ft. run: three bundles or 36 being now ripped out of one deal, but these are too slender. PAN TILE.

Plain tile laths.—Those on which the plain tiles are suspended by pins. They were formerly (circa 1750) made of good heart of oak and called 'heart laths'; a bundle of 4 ft. laths was supposed to contain the long hundred or 120, but it now only contains about 100; and a bundle of 5 ft. laths, 100; 30 bundles of each making a load. If of fir they are prepared as subsequently noticed, but should be 1½ in. wide and the double thickness. If of oak ½ in. to ¾ in. is now considered thick enough. PLAIN TILE.

Moxon, Mechanick Exercises (bricklayer's work), 4to., London, 1700, p. 7, makes the distinction that heart of oak laths were for outside tiling and plastering, and those of fir for inside plastering and pantile lathing; the former were 4 and 5 ft. long, by 2 ins. or 1½ in. wide, and about ½ in. to ¾ in. thick, (and 37½ bundles of 4 ft., and 30 bundles of 5 ft., laths used to make a load, LANGLEY): for pantiling, they were 10 ft. long, 1½ in. wide, and ½ in. or more thick.

Plasterer's laths are generally cleft or "rent" out of yellow fir, good ones out of heart of fir, the best for the purpose being old ships' masts. They run in length from 2 ft. 6 ins. to 4 ft. 6 ins. The stuff being cross cut is cleft into pieces called "bolts" from 1 in. to 1¼ in. wide by the 'dowl-axe', and by large wedges, by the FELT GRAIN; and then "rent" by the QUARTER GRAIN with a species of knife (called a 'chit'; NEVE, *Dict.*) into slips from ⅜ to ½ in. in thickness. These are called 'single laths', those half as thick again are called 'laths and a-half', and twice the thickness 'double laths'.

Single laths inch wide, 5½ to 6 rent out of inch thick.

Lath and a half " 4 "

Double laths " 3 "

There should be 480 ft. run in each bundle, but there are now seldom more than 400. That is 100 laths in a 4 ft., and 160 in a 2 ft. 6 in. bundle; 30 of these make a load. It is said that 40 ft. of oak round timber will not make above thirty hundred, of which number above one third part will be sap laths. A foot of timber will make a bundle of a hundred laths when made very slight. "Fir or deal laths are of diverse lengths as 3, 4, 5 and 6 ft., but they are all reduced to the standard length of 5 ft.; so every run of bundles (each bundle containing 100 laths), is a load, being equal to 30 bundles of 5 ft. laths;" LANGLEY, *London Prices*, 8vo., London, 1750, p. 52; HAVILAND, *Improved Post Measurer*, 8vo., London, 1817.

Laths are sometimes sold in bundles of 3, 4, and 5 ft. lengths; the 3 ft. laths contain eight score, the 4 ft. laths six score, and the 5 ft. laths five score, to the bundle. This statement must be compared with the following tables, which with severe strictures upon the prevalent want of honesty among lath-renders as to quantity and the mixing short lengths with the longer ones in a bundle, are given in BUILDER JOURNAL, xix, 430.

TABLE NO. I.

| Laths | Proper number in a bundle | No. 1 ft. of feet in each bundle | Number in a bundle as now usually of feet in each bundle | Number of feet in each bundle |
|-------|---------------------------|----------------------------------|--|-------------------------------|
| 4 ft. | 120 | 480 | 100 | 400 |
| 3 ft. | 136 | 408 | 110 | 365 |
| 3 ft. | 140 | 420 | 120 | 360 |
| 2 ft. | ... | ... | 120 or (125) | 320 |
| 2 ft. | 150 | 375 | 130 | 325 |
| 2 ft. | 155 | 348 | 125 | 313 |
| 2 ft. | 160 | 320 | 140 | 280 |
| 1 ft. | ... | ... | 160 | 240 |

TABLE NO. II.

| Laths | Proper number in a bundle | No. 1 ft. of feet in each bundle | Number in a bundle as now usually of feet in each bundle | Number of feet in each bundle |
|-------|---------------------------|----------------------------------|--|-------------------------------|
| 4 ft. | 120 | 480 | 100 | 400 |
| 3 ft. | 136 | 408 | 110 | 365 |
| 3 ft. | 140 | 420 | 120 | 360 |
| 2 ft. | ... | ... | 120 or (125) | 320 |
| 2 ft. | 150 | 375 | 130 | 325 |
| 2 ft. | 155 | 348 | 125 | 313 |
| 2 ft. | 160 | 320 | 140 | 280 |
| 1 ft. | ... | ... | 160 | 240 |

Laths are used a little stronger for partitions than for ceilings to guard against injury; though GWILT, *Encyc.*, § 2238, says, "the thinnest laths may be used in partitions, because in a vertical position the strain of the plaster upon them is not so great."

Slater's laths are cut to boards of 20, 25, 30 or 36. Thus, a board 12 ft. by 9 ins., by 3 ins., cut 3 deep and 4 flat = 20; a board cut 4 deep and 4 flat = 25; a board cut 4 deep and 5 flat = 30; and one cut 5 deep and 5 flat = 36, laths: GRANDY, *Timber Importers', etc., Guide*, 8vo., London, 1865, p. 123.

As there was a doubt under the late Building Act whether wooden laths could be used for the soffits of projecting eaves on account of their being combustible, in several cases sheets of zinc were cut into the usual width of laths and employed in their stead. This is not the case at present: but galvanized iron hooping has been urged in BUILDER JOURNAL, 1853, xi, 684, for 'fireproof ceilings', and the method of forming them is therein described. Wire work in place of laths for forming ceilings and for other plaster surfaces, was patented 9 January 1841 by L. Leconte; iron laths had been adopted in the erection in 1829-30 of the Pantechnicon near Bolgrave-square. Ceilings at the Chester Lunatic Asylum are said to have been formed of wire work of about ½ in. mesh, galvanized or japanned to prevent corrosion; and considered to render them fireproof; BUILDER JOURNAL, 1849, vii, 317. Laths of thin strips of slate are suggested in the PRACTICAL MECHANIC'S JOURNAL, 1854, vi, 284. SLATE GROUND.

A. A.

LATH (Fr. *échasse*; Ger. *mass-stab*). A sort of rule, being a flat piece of planed up wood on which workmen mark off certain dimensions to which they have to work, in lieu of using the usual measure.

It is also a flat piece of thin wood (Fr. *échalas*; Ger. *pfahl*) used to form lattice and trellis work; as also a Venetian blind.

LATH AND PLASTER WORK. Plaster laid on lathing applied to timbers (PLASTERER'S WORK) either as joists for a ceiling, or of studs for a partition to form the side of a room or passage. Good work requires laths of the quality known as 'lath and a-half' made out of the best heart of yellow fir, secured with nails 1¼ in. long, and the "lay" coat or plastering thereon, to be formed of 1¼ lbs. of the longest and best quality of cow's hair to a bushel of lime. Constructions of this sort have been found to resist successfully the action of fire in a dwelling house.

LATH BRICK. A species of brick made in some parts of England, and chiefly used in the drying of malt, as it retains the heat a long time. It is 22 ins. long and 6 ins. wide. 1. 2.

LATHING (Fr. *latis en volige*). The operation of nailing up laths: also any quantity of laths so fixed. Those for plain and pan tiling



are fixed apart according to the gauge of the tile. Plasterer's laths (B) should be so far apart as to allow a tip of a finger to be thrust in between each, otherwise there will not be sufficient hold or key for the plaster, which will then break away.

A. A.

In pan tiling;—a bundle of No. 12 laths 10 ft. long, with 1¼ hundred of 6d. nails, is sufficient for a square laid at a 10 in. gauge.

In plain tiling;—a bundle containing about 100 will suffice for a square laid to the ordinary gauge. "About 90 laths of 5 ft., and 112 of 4 ft., will complete a square, counter laths and all, at 7 ins. gauge; the 8 in. gauge will require fewer."

4.

In plastering;—a bundle (480 ft.) of laths, will cover on an average 4½ yards super. 500 cast nails (i. e. six score to the hundred=600) are used to a bundle of laths. Plasterers use 10,000 nails to a load of laths, 30 bundles to the load. 200 of 4 ft. laths will do a square (GRANDY). A bundle of laths (no matter what length) containing 400 ft., the laths 1 in. wide, will cover 5 square yards. The load, allowing 10 yards for lap and waste, will cover 140 yards; but a load of the cheap

short-tale laths will not cover 100 yards; *BUILDER Journal*, xix, p. 431.

LATHING HAMMER. One used by the plasterer for the purpose of lathing; it is exactly like a bricklayer's hammer, except there is a notch by the side of the cutting end by which to draw out nails, and it is smaller and lighter. The hammer end is diamond headed to prevent slipping, as cast iron nails used by the plasterer have pointed heads. The lathing hammer used by the tiler has two gauge strokes cut upon the handle of it, one at 7 ins. from the head, the other at 7½ ins.; some persons lath at 8 ins., but that occasions "rainings in", i.e., the water gets under.

A. A.

LATHING STAFF. A staff of iron made in the form of a cross, used by a tiler, to stay the cross laths while they are being nailed to the long laths, and also to clinch the nails. *MOXON, Mechanick Exercises*, 4to., London, 1700 (bricklayer) p. 11.

LATH NAILS. Nails used by the plasterer. They are generally of cast iron with pointed heads and for single laths are about ½ in. long. Lath and a half, and double, laths should be nailed with wrought clout nails, from the greater strength required.

A. A.

Lath or "reparation" nails were stated by *MOXON, Mechanick Exercises* (bricklayer's work), 4to., London, 1700, p. 8, to be used for plain tile lathing, and outside and inside lathing for plastering; other sorts are 4d. and 6d. nails, used for pan tile lathing. Plain tiles are hung with a PIN or PEG.

LATH SPLITTER. The mechanic who forms laths. The *EDINBURGH NEWS Journal*, 23 October 1852, in an account of this trade, notices that laths were regularly cut out previous to 1790, when the art of splitting deal was then introduced by a London plasterer into that city. The first buildings in which the new method was used were S. Andrew's church, and the Tontine buildings in George-street, at Edinburgh. This term is synonymous with the English 'lath render.'

LATH WOOD. Wood prepared for subdivision into laths is sold at per fathom; one fathom making a load. In 1849, Russia exported 15,539 loads of lath wood, Sweden 1,119, Norway 103, Prussia 6,169, and British North America 14,813. The wood from Cronstadt, Riga, and Memel, is the best; that from the first named place is the easiest worked and most profitable, the American is of inferior quality and less profitable, to split.

LATHIN STYLE. The denomination proposed for the earlier part of the style generally called Romanesque, by A. LENOIR, *Architecture chrétienne de l'occident*, in the *REVUE GÉNÉRALE*, 4to., Paris, 1840, i, 257, 321, 449, 585; his illustrations are confined to Italian examples. He insists that the word *Latin* is properly the epithet to be applied to the works executed in rubble or in brick, with strings, dressings, and other truly Latin details, in the manner which did not lose its peculiarity at Rome from the time of Constantine to that of the Renaissance, which he undertakes to show was adopted and followed in France and in part of the Western Empire until the Carolingian period. He reserves the title *Romanesque* for the works of the Normans, executed after the death of Charlemagne, displaying "formes lourdes et pesantes, encadrées de tores, de baguettes épaisses," which appeared in the eighth century, or a little earlier." *BATISSIER, Histoire de l'Art Monumental*, 8vo., Paris, 1845, p. 457-62, devotes a chapter to the 'Style Latin' from the fourth to the eleventh centuries. Both these works should be compared with NESBITT, *On the Churches at Rome earlier than the year 1150*, in the *ARCHÆOLOGIA* of the Society of Antiquaries, 4to., Lond., 1867, xi, pt. ii, p. 160, whose use of the words "Latin style" refers only to the period 750-1150.

LATHIN CROSS, see **CROSS**, and **CROSS CHURCH**

LATHOMIE and **LATHUMIE** (Gr. λατομία, λατομία, and λατόμιον). The Latin name for a stone quarry. As an example, besides the **LABYRINTH**, may be quoted that, "In the

north-west corner of the latomia, bordering Neapolis at Syracuse, the excavation most worthy of notice is called the 'ear of Dionysius'—about 20 ft. wide and 63 ft. high, and in plan somewhat of the shape of the letter S"; this, with a vast cavern contiguous to the above excavation, is given in *GOLDICUTT, Sicily*, fol., London, 1818-9, pl. 24-5. **EAR**. Such excavations frequently served as prisons.

25.

LATOMION. "It is unusual to find the term λατόμιον used to express the stone tomb on which the body of a deceased person is placed; Σόπος is generally applied:" but the former word occurs in an inscription on a sarcophagus on the European shore of the Propontis; as noticed in *WALPOLE, Memoirs*, 4to., London, 1817, p. 463.

LATOMUS (**HENRY**), see **HENRY**.

LATOMUS and **LATHOMUS**. A term (Gr. λατός, from Greek λαός, stone, and τέμνω, to cut) used in the latter part of the thirteenth century for a worker in stone; during the fourteenth it appears to have been applied as often to a mason executing cut work, as to one performing rougher work, or labouring at the quarry, which last is its more correct definition. In the *Vocabularies*, edited by T. WRIGHT, 8vo., Lond., 1857, two of the fourteenth and fifteenth centuries, have "Latamus, mason"; "Lathomega, a rule"; and "Latomega, a mason ax". In the *Durham accounts* are "iii latomers", apparently meaning three hammers, or tools of some kind. *PAPWORTH, On the Superintendents—and Masons, etc.*; two papers in the *Transactions* of the Royal Institute of British Architects, 1859-60 and 1861-62. The term occurs in the following instances:—

1257. Lathome, in an inscription on base of south portal at the cathedral of Notre Dame at Paris; *CHELLES* (J. DE).
1319. Henry lathomus, at Evesham.
1334. Richard de Farleigh lathomi, at Exeter cathedral; also called cōmentarii, in the Fabric Rolls.
- 1370-1403. Lathomus is appended to William de Wynneford's portrait in the glass at the college of Winchester.
1396. Lathomos vocatus fiamaceus, and Lathomos vocatus ligiers, occur in a writ 19 Richard II, in *RYMER, Fœdera*, xvii, Synopsis.
1430. T. Wolvey latomus summus in arte, on a gravestone in S. Michael's church at S. Alban's.
1484. Commission by king Richard III to T. Daniel, his surveyor of the works, wherein "Lathamos Fabros" occurs; *JURR, Carpenter's Company*, 8vo., London, 1848, p. 184, 329, who supposes their occupation to be that of forming stone balls for ordnance.
1488. John Bell latimi, at Durham; *SCOTTS SOCIETY, Hist. Dunelm. Script. Tres*, 8vo., Newcastle, 1839, cccxxiii.
- 1490-1. Willielmo Blych latamo, operanti super—dealacione partis inferioris predicti dormitorii, lixij; *SCOTTS SOCIETY, Finchale Priory*, 8vo., Newcastle, 1837, cccxc.
1505. W. Hyndeley de Ebor latamus; *SCOTTS SOCIETY, Fabric Rolls*, 8vo., Durham, 1859.

CEMENTARIUS; **FRÆMASON**; **INTAILER**; **LAPICIDA**; **MAR-MORIARIUS**; **MASON**.

LATHIOPOLIS (the modern **ESNEH**, Asneh, or Esné; Coptic **Sne**). A town near Thebes in Upper Egypt, now a poor filthy place, consisting of mud huts, with a bazaar of similar construction, but extensive mounds prove it to have been once a place of great extent, of which the only remains are the pronaos of a temple dedicated to Chnuphis, which was again cleared out in 1842 by order of Mohammed Ali. *ΠΑΝΚΟΥΚΕ, Descr. de l'Égypte* (Antiquités), fol., Paris, 1821, i, pl. 72-83, texte i, 366, illustrates the plan, and details, with elevations of the capitals of the twenty-four columns (shown in *Illustrations*, 1859, pt. 1); each about 17 ft. 9 ins. in circumference, and 37 ft. high, in four rows of six each in face; and pl. 79 the zodiac on the ceiling similar to that at Dendera. The pronaos is 122 ft. 6 ins. long outside, 66 ft. deep, and presents the names of Tiberius Claudius Germanicus, and Vespasian (14-79) over the entrance; and those of Trajan, Hadrian, and Antoninus (98-160) in the interior; the name occurs of Thothmos III (B.C. 1495-56) by whom the original temple was perhaps founded; Epiphane (B.C. 205) occurs on the back wall. *RAMÉE, Histoire*, 12mo., Paris, 1843, i, 230, notices that except

a little sculpture under Domitian (81-96), all the work on the side walls bears the titles of Septimius Severus, and Geta (193-217). HOREAU, *Pan. de l'Egypte*, fol., Paris, 1841, pl. 22, gives a good view in the pronaos.

A little to the north-west of the town is a temple dedicated to Chnuphis, Neith and Hake, which exhibits the names of Ptolemy Euergetes I and his wife Berenice, of Ptolemy Philopator on a column, of Hadrian (117-38) on one part of the cornice, and Antoninus and Verus (138-186) in barbarous hieroglyphics on another. The *Descr. de l'Egypte*, pl. 84-88, illustrates this temple, with pl. 87, a zodiac. HOREAU notices that only one of the antæ and one column existed when he saw the temple. The *Descr.* pl. 84 and 88-9, also gives the small temple on the opposite bank of the river. CHAMPOLLION, *Lettres*, 8vo., Paris, 1833, p. 199-204. 25. 28. 50.

LATRINA (Fr. *latrine*). The mediæval name for a PRIVY. DRAUGHT HOUSE; FORENE; GARDEROBE; JQUES.

LATROBE (BENJAMIN HENRY B...), the second son of the Rev. Benjamin Latrobe, [who was a descendant of a Protestant noble family in Languedoc, and the superintendent of the Moravians in England; he died 29 November 1786 in Fetter-lane, in the fifty-ninth year of his age, and was buried in their cemetery on the site of Beaufort-house, Chelsea; a son succeeded him: his portrait by J. Astley, is given in AIKIN, *Manchester*, 4to., Lond., 1795, p. 455.] The son was born 1762 at Fulner near Leeds, and was educated there until 1777, when he was sent to their college at Nisky in Saxony, where he studied the classic languages with mathematics, and directed his attention to what was considered the elementary portion of architecture. Having returned 1783 to England, he was placed in the Stamp Office by the interest of his father, and remained there until the death of that parent, when he pleased himself by entering the office of an architect in the city of London, who recommended him to assist another "in a great line of business" (probably S. P. Cockerell); with this second master he soon had some disagreement, and returning home was on the same day encouraged to commence practice by Mr. Sperling, who at once desired him to build Hammerwood lodge (afterwards (1820) the property of Mr. Dorrien Magens) near East Grinstead, in Sussex. This work procured him the commission to erect the house at Ashdown park for Trayton Fuller, Esq., and he subsequently obtained a good rural practice, chiefly in Surrey and Sussex, as well as the arrangement of the police-offices in the metropolis. Perhaps because he was a personal friend and follower of C. J. Fox, he would not remedy (by an appointment offered by Lord Barham) the disorder of his affairs consequent upon his illness caused by the death of his wife: he therefore resolved to visit his maternal uncle, Colonel Antes, living near Philadelphia, on the Susquehanna.

His vessel, after a ten weeks' voyage, ran in distress into Norfolk in Virginia, where he met colonel Bulstrode Washington, and thus procured an introduction to the president. Having rendered the river James navigable, he was appointed engineer to the State of Virginia; and after residing some time at Richmond, he went to his uncle at Philadelphia, where he supplied the city with water. The engine-house, placed in the centre of the principal square, was of marble with monolithic columns 16 ft. in height. He also erected there the bank of Pennsylvania, of white marble, vaulted throughout, and covered with blocks of marble; six of them are from 21 to 25 ft. long, 5 ft. wide, and 1 ft. thick, forming the roof and cornice of the attic of the central portion. This he always considered his best work, as having given the tone to the architecture of Philadelphia, and to have changed that of the whole country. He was then employed to repair and improve the works of defence on the coast, and the lighthouses. Resigning his post of city engineer, he removed with his second wife from Philadelphia to Washington, and was appointed surveyor of public works to the United States. There he finished the exterior of the north wing of the capitol, left incomplete from

the hands of its original designer, Dr. William Thornton, "an ingenious but wrong-headed physician; of a French architect from S. Domingo; of Mr. [George] Hadfield an excellent English architect (brother of Mrs. Cosway); of Hoban an Irish carpenter; and of Blagden an English stonemason"; but he altered the interior, added the corresponding south wing, "gave the final plan for finishing the capitol" (DUNLAP, 336,) and designed the central portion: the Hall of Representatives, burnt 1814, was 100 ft. long by 80 ft. wide, and vaulted in brick 50 ft. high, it was surrounded by twenty-four highly-sculptured columns, 28 ft. high, of the Corinthian order, having a rich entablature, all of stone. HADFIELD. C. BULFINCH succeeded Latrobe on his resignation in 1818, and erected the rotunda, etc.

Having obtained the exclusive privilege of supplying water to New Orleans, he confided 1811 the works to his eldest son Henry, who, although only seventeen years old, would have been able to perfect them: but 1817 the son died, leaving the concern, and 50,000 dollars involved in it, in a state so precarious, that Latrobe resigned his public appointment and went 1818 to New Orleans. On the road he spent a year in BALTIMORE, completing the cathedral and the exchange, which he had designed for that place, and which were then, respectively, the largest church and the largest public building, except the capitol, in the United States. He removed his family to New Orleans on 20 April 1820, meaning to reside there for a year or two, until the water works were in regular train and no longer required his immediate directions; but he succumbed to the yellow fever 3 September 1820 while preparing the publication of his chief designs. In that year — Strickland, one of his pupils, was erecting from Latrobe's design, with the alteration of filling the principal room with columns, the Bank of the United States at Philadelphia. ACKERMANN, *Repository of Arts*, etc., 8vo., London, 1821, new series, xi, 31-3; and private MS.

LATROBE (HENRY SELLOM BONEVAL), the eldest son of the above, was born 1793, and educated at Baltimore; having been instructed by — Godefroi in civil and military architecture, he then entered his father's office, and assisted him in the public works at Washington. Sent 1811 to New Orleans to carry out his father's plans for the water-works, his labours were interrupted by the English, against whom he served as assistant-engineer to major Latour. He was appointed 1815 on a commission for the erection of a lighthouse, the design for which is highly praised. All the works for bringing water to New Orleans were destroyed by fire 1816, and while endeavouring to remedy the mischief, he was seized with fever and died in August (not in 1816 but in) 1817 as above stated.

JOHN H. B. LATROBE, another son, a lawyer at Baltimore, was an amateur architect, draughtsman and painter.

B. H. LATROBE, the youngest son, was also brought up to architecture, and has distinguished himself: DUNLAP, *History of Arts of Design*, 8vo., New York, 1834, ii, 467.

LATTBRODDS, or lath prods or nails, occurs in 1531; as noticed in SURTEES SOCIETY, *Finchale Priory*, 8vo., London, 1837, Gloss. 434.

LATTEN, also written Latayne, Laten, Laton, Lattin, Lattoun, Leton, and Letten. (It. *ottone*, *lattice*, and *latta*; the term *latten* meaning only "tinned iron;" Sp. *alaton*, *laton*; Fr. *létou*, *laiton*; Ger. *latten*; Dutch *latoon*; Welsh *lletton*; these are similar names, but all may probably be synonymous for "brass"). The name of a pale yellow metal like brass, extensively used during the mediæval period for crosses, candlesticks, plates for tombs, monumental effigies, basins, and other objects of use and art. The term is mentioned by DU CANGE, *Gloss.*, 4to. Paris, 1843, s. v. Lato, in the passage "Charta ann. 1054, Donamus duos bacinios de latone"; and "latoun" has been found explained as the Anglo-Norman for a metal like brass. A vocabulary of the fifteenth century contains "Es, ris, brasse. Electrum, pewtyre; Auricalcum, latone"; MAYER,

Vocabularies, by T. Wright, 8vo., London, 1857. Most dictionaries explain the term as synonymous with the ORICALCUM of the ancients; as composed of copper and calamine (carbonate of zinc); while others dating 1720-88 explain it as "iron tinned over", and describe the present process for making BLOCK TIN. JUNIUS, *Nomenclator*, edited by Higin, 12mo., London, 1585, has "Æs coronarium, Orichalcum, Leton. Laton metal." LYDGATE, *Boke of Troye*, fol., London, 1555, mentions "brass, copper, and laton"; and GOWER speaks of it as distinct from brass. 13.

The tomb and effigies of king Richard II and his queen were 1395 contracted for to be in "coper et laton endorres"; RYMER, *Fœdera*, fol., London, 1709, vii, 796-7: and the plate and effigy of Richard Beauchamp, earl of Warwick, at Warwick, were also contracted for (1449-54) to be of "the finest latten" with its hearse, images, scutcheons, etc., all to be gilt; the plate is specially mentioned as to be "of the finest and thickest Cullen (Cologne) plate"; the latten for the hearse cost tenpence a pound: DUGDALE, *Warwickshire*, fol., London, 1765; BRITTON, *Antiquities*, 4to., London, 1807-14, iv.

The analysis of a Flemish "brass" in the museum of Practical Geology, London, having the dates of 1496 and 1504, gave copper 64.0, zinc 29.5, lead 3.5, and tin 3.0; *Descriptive Guide*, etc., 8vo., London, 1859, p. 233.

BAILEY, *Dict.*, 1736; TODD, *Dict.*; NARES, *Glossary*, edit. by Halliwell and Wright, 8vo., London, 1858; PHILLIPS, *New World of Words*, 7th edit. by Kersey, fol., 1720; The French *Manuel Lexique*; JAMIESON, *Scottish Dict.*, 1808; JUNIUS, *Etym. Angl.*, fol. Oxford, 1743; GALFRIDUS, *Prompt. Parv.*, 1499, edit. by Way, 8vo., London, 1843-53; COTGRAVE, *Dict.*, 1650; J. D(AVIES), *Ancient Rites, etc., of Durham*, 12mo., London, 1672, p. 20; CHAUCER, *Canterbury Tales* (Pardoner, and Frankeleyn, v, 11557); SHAKESPEARE, *Merry Wives of Windsor*, act 1, scene 1; STRINGER, *Opera Mineralia explicata*, 8vo. (1713), p. 20, and 34; DOUGLAS, *Virgil*, 1513, 238, b. 49, and 265, b. 40; ARCHÆOLOGIA, 1827, xxi., 261; MATHURIN JOYSSÉ, *Servurier*, fol. Paris, 1627, chap. 12; FULLER, *Holy Warre*, fol., Camb., 1639, iii, chap. 13. All these references are noted in a complete article on latten, in NOTES AND QUERIES *Journal*, 1867, Ser. 3, xii, 301, et seq. W. P.

The term "latten brass" is now used for a composition of shot copper, powdered calamine and charcoal, with some scrap brass, melted into a plate and then rolled into sheets of thicknesses as required. 14.

LATTERKIN or LAPERKIN. A tool used by glaziers, being a piece of hard wood pointed, and so formed as to clear the groove of the leads of a casement, and to widen it more readily for receiving the glass. 1.

The laperkin is a short piece of wood made straight on one edge, but the contrary side indented or rounded as the workman pleases. With this, being a kind of ruler, he cuts quarries of any size, and how he will, to fit them for the place he intends to set the same; HOLMES, *Accidence of Armory*, fol., Chester, 1688.

LATTICE, derived from the Anglo-Saxon *latt*; SKINNER, *Etym.*, gives other and curious derivations. From an analogy with the heraldic terms, it is supposed that lattice work strictly is that in which the pieces pass alternately over and under each other, as *fretty* in contradistinction to TRELLIS WORK where the pieces simply overlap each other and are nailed (*eloué*) at the intersection, and also to GRATING which in carpentry signifies pieces of thicker material that are halved on each other and so present a flush face. It is the protection of an opening by pieces of thin wood, such as laths, intersecting or crossing each other. Under the law which taxed windows, a dairy or cheese-room was exempt if it were not glazed but only protected by a lattice of laths or splints, and if the words "dairy" or "cheese-room" were painted over it in legible letters. Since the repeal of this statute the word lattice is

scarcely ever used except in works for ornamental gardening as for arbours, etc. JALOUSIE. The eastern lattice work so called, is noticed s. v. Perforated work. The term "lattice window" was formerly applied to one made of small diamond shaped panes set in lead work. A. A.

The cella Solearis of the baths of Caracalla had a ceiling of bronze lattice work, recorded by SPARTIAN, as inimitable in the opinion of the best architects of his time.

The making of "all frames for pictures, lattices for scribenors or the like", belonged 1632 to the joiners: the making of "porches and of lattices and bars for taverns and other victualing howses," belonged to the carpenters: JUPP, *Carpenter's Company*, 8vo., London, 1848, p. 296; 301.

LATTICE was the name given to a part of a theatre priced between the boxes and the pit; "the interior of the house (circa 1793) formed an ellipse, and was divided into three compartments—pit, boxes, and lattices, which were without division," WARBURTON, etc., *Dublin*, 4to., Dublin, 1818, ii, 1113, 1118.

LATTICE, TRELLIS, or FRAME, BRIDGE. Although this method of construction was called 'trellis work' when first employed, the term lattice is now usually given to it. It appears to have been invented and patented for iron work in 1824 by G. Smart, of Westminster Bridge Wharf, Lambeth; was adopted by Seppings in naval architecture; and was carried out by Ithiel Town of New Haven, an architect of New York, in the formation of timber-built bridges of considerable span. Only small pieces of timber are required. The roadway is carried on a frame of continuous trellis work made of planks, double or treble, 10 or 12 ins. wide and 3 to 3½ ins. thick, placed parallel to each other at an angle of about 45° with the horizon, crossing nearly at right angles, and alternating from right to left. The angle at which the trellis crosses forms really a kind of lozenge, which, if 3 ft. long, would be about 2 ft. 9 ins. broad. The bottom of the trellis is strengthened on each side by string pieces running from one end of the bridge to the other, 12 ins. by 3 ins., in lengths of from 35 to 40 ft. These string pieces are double on each side of the trellis, so that each trellis is secured on each side by four pieces of timber, 6 ins. thick. At the top of the trellis is a similar string piece. On the lower ones are placed the transverse beams, which carry the floor timbers: the upper ones in the bridges first constructed carried the roof. The crossings of the trellis are secured by two pins of sound oak 1½ in. thick, carefully turned on a mandrel, and fitted neatly into holes previously bored; in the more expensive bridges, further secured by a wedge-like pin driven into their centres on each side. The strings are secured by four pins. Such was the original plan described by Town, *Improvement in the Principle of Bridges—whether of wood or iron*, 4to., New York, 1839.

The height of the trellis depends upon the strength required: for 200 ft. spans a height of 17 or 18 ft. is given. Town recommended that in most cases the height should be a tenth or twelfth of the span. When the flooring rests on the string piece the height of the carriages will not admit of the trellis being less than 13 or 14 feet. It has been observed that these bridges are apt to settle, and that when once bent they lose much of their strength. To increase the resistance of the trellis, it may be doubled on each side of the bridge, and the frames separated so that the horizontal diagonal of the lozenge between four adjacent trusses should be 4 ft. 6 ins. instead of 3 ft. This increases the cost of the wood on each side of the bridge 50 per cent., but on two-way bridges he omits the trellis work originally placed between them. The frame may be strengthened by repeating a string piece immediately above the crossing of the pieces of the trellis. In the bridge at Richmond (noticed hereafter) these two methods of obtaining strength have been used. By laying the flooring on the heads of the timbering, the means of preventing settlement is obtained by interior braces. The beams not being arched, the piers are

not subjected to lateral thrust, and they only require the thickness necessary to resist the vertical pressure represented by the weight of the bridge.

Moncure Robinson, C.E., has erected a large number of such bridges, with improvements; that at Richmond, in Virginia, over the river James, being the most remarkable one. It was 2,844 ft. long between the abutments, with 19 openings, one being of 130 ft., four of 140 ft., four of 150 ft., and ten of 153 ft. span, from centre to centre of the granite piers, which were 7 ft. 6 ins. thick by 21 ft. long; the highest 40 ft. above low-water mark, and to the top of the rails 20 ft. more. It was commenced Dec. 1836, and completed 5th Sept. 1838: it is engraved in the *CIVIL ENGINEER*, etc., *Journal*, 1840, iii., 125-6, with a description in detail, taken from DALY, *Revue Générale*, i., 33-42, pl. 3; *ALLGEMEINE BAUZEITUNG*, 1851, pl. 396: this bridge ultimately proved a failure, and was removed; HUMBER, *Practical Treatise*, fol., Lond., 1857, p. 92.

The viaduct over the Wissahicon, on the Philadelphia and Norristown railway, 483 ft. long, in three spans, 78 ft. above the bed of the stream, was built in sixty-eight days. A bridge 2,200 ft. in ten spans was built 1828 over the Susquehanna at Clarke's ferry, near Duncan's island, just above Harrisburg in Pennsylvania. Another, 1,530 ft. long, was built over the Hudson at Troy, with two ways, each 15 ft. wide, separated by an additional truss, with double trusses on each side; the chief spans were 180 ft.; the flooring was at the bottom. In 1835 others of great span existed at Newbury Port, Northampton, and Springfield, all in Massachusetts; at Tuscaloosa, in Alabama, opened Dec. 1834 over the river Black Warrior, four spans each of 220 feet; this trellis is 16 ft. high, its cost was £6,400: at Providence; and over the Merrimac at Nashua in New Hampshire. The first bridge over the Great Conestogo for the Philadelphia and Columbia railway was 1,412 ft. long, in nine spans of 150 ft.; the flooring 22 ft. wide, resting on the string-pieces with trusses only 2 ins. thick; this was found too weak, and was rebuilt. An example of Town's system, 136 ft. span, at Peacock Falls, Pennsylvania, is given in *Illustrations*, 1861, pt. 2.

The strength is obtained by the connection of the bars with the top and bottom pieces and at each intersection; one strain is, therefore, borne wholly by the rivets or pins which pass through the crossing bars; and the effect of this strain is exhibited in the gradual indentation of the wood and eventual loosening of the pins; the bars, too, are necessarily weakened by the holes, hence fracture and failure have often resulted. To remedy these defects many of the large lattice bridges in use in America have been strengthened by the introduction of strong trussed frames within the lattice frames, or of strong arches of timber work; DEMPSEY, *Tubular, etc., Bridges*, 12mo., London, 1850, p. 37. The system is now considered useful only for ordinary road bridges where the transport is not heavy; in fact, it is nearly abandoned. HAUPT, *Bridge Construction*, 8vo., New York, 1856, p. 260, pl. 14, describes the *improved lattice*, rendered necessary from the warped condition of the side trusses of the original designs. NEWLAND, *Carpenters', etc., Guide*, fol., London, 1860, p. 169, pl. 54, gives an illustration of the *common* and of the *improved lattice*; the latter consists of uprights or ties, with braces on each side of the centre of the bridge, inclining to its centre post, and put in pairs, one on each side of the truss, with an arched brace extending from one abutment to the other. For ordinary spans, the dimensions of the timbers may be, braces, 2 in. by 10 in., in pairs; ties, 3 in. by 12 in.; arches or arch braces, 6 in. by 12 in.; chords, 3 in. by 14 in. lapped; and pins, 2½ in. in diameter. *ALLGEMEINE BAUZEITUNG*, 1851, pl. 396, also shows the variations: Remington's system appears to be another application of the lattice principle, as shown in pl. 397.

STEVENSON, *Civil Engineering of North America*, 8vo., London, 1838, p. 231-4, gives Town's patent lattice bridge for 73 ft.; one, by M. Robinson, on the Philadelphia and Reading

railway 1,100 ft. long, on ten stone piers; another, on the New York and Haerlem Railway, 736 ft. long on four stone piers; and another, over the Susquehanna at Columbia, about a mile and a quarter long, of 29 arches each of 200 ft. span, as explained in *CIVIL ENGINEER Journal*, 1849, xii, 15. A *passerelle en bois à poutres Américaines*, over the Columbine (Haute Soane) by Thomassin, 39 ft. 4 ins. (12 metres) span, is given in *NOUVELLES ANNALES DE CONSTRUCTION*, 1856, ii, pl. 60: a temporary bridge for the pont S. Michel at Paris, by Lagallissier and Vaudrey, 150 ft. span, in 1858, iv., pl. 29-30. The *ALLGEMEINE BAUZEITUNG*, 1845, pl. 644, gives the bridge over the Mohawk on the Utica and Schenectady railway, North America, with 136 ft. spans; and pl. 645 some smaller ones over the Erie canal, all on the improved principle.

The examples of the timber lattice bridge in England have been confined to the attempts by Captain W. S. Moorsom on the Birmingham and Gloucester Railway; but although of small span, these bridges required strengthening by wrought iron ties; HUMBER, *Practical Treatise*, fol., London, 1857, p. 92. One of these bridges, 117 ft. clear span, is given in BREES, *Railway Practice*, 4to., London, 1840, ser. 2, pl. 9.

IRON LATTICE BRIDGES.

The adaptation of this principle to bridges of *wrought or malleable iron* was introduced into Great Britain by Sir J. Macneil, C.E., and J. Thomson, C.E., of Glasgow. The first bridge was constructed about three miles from Dublin, on the Dublin and Drogheda railway, and was completed 1843; the span is 84 ft. clear over an excavation of 36 ft. in depth; the trusses, 10 ft. high, one on each side of the railway, are formed of small bars about 12 ft. long, 2½ in. wide, and ¾ in. thick, riveted at the intersections: its total weight was only 14 tons, and it sustained a load across its centre of 24 tons, under which the deflection was only ⅓ of an inch: the cost was £510, including the masonry of the abutment. A viaduct of 230 ft. long, with a central span of 140 ft., over the Royal canal near Dublin, for heavy traffic, has a third lattice frame in the centre with bars ½ in. thick: heavy cast iron trusses and chains had to be placed at each end to counteract the unequal strains. It was calculated that the expense was half that of stone, and after the conclusion of an investigation into their principle, it was considered that much saving might probably be made both in the quantity of material and workmanship. The principle is also applicable to the widening of existing bridges by the addition of a footway on each side; Institution of Civil Engineers, 11 December 1843, and 9 Jan. 1844; *CIVIL ENGINEER Journal*, vii, 10, 22; *ALLGEMEINE BAUZEITUNG*, 1848, pl. 148-9. One of the finest examples of this principle was erected by Sir J. Macneil, over the Boyne at Drogheda, on the Dublin and Belfast junction railway, the details being entrusted to J. Barton; it was completed March 1854, and opened for traffic 5 April 1855: the main span is 264 ft. between the supports, the two side spans 138 ft. 8 ins. each, with twelve semicircular arches of masonry 61 ft. span on the south or Drogheda side, and three arches on the other side; the height is 90 ft. above high water of spring tide to the underside of the frame, which is 22 ft. 6 in. deep: CLAYTON in *Sess. Papers of the Royal Institute of British Architects*, 1865-66, p. 139; HUMBER, *Practical Treatise*, p. 93, fol., London, 1857; and Institution of Civil Engineers, *Minutes*, 8vo., London, 1855, xiv, 452.

The following examples are illustrated as here respectively noticed. A bridge for a roadway over the Rugby and Leamington railway, by W. T. Doyne, 150 ft. span, 10 ft. 6 ins. deep; Institution of Civil Engineers, *Minutes*, 1850, April 23; *BUILDER Journal*, 1850, viii, 214. A bridge, erected by J. Hawkshaw, C.E., on the Lancashire and York railway; *CIVIL ENGINEER Journal*, 1849, xii, 161, pl. ix. Three bridges, erected by — Hartmann, engineer of the S. Gall and Appenzell railway; one over the Sitter is about three miles from S. Gall,

560 ft. long, 200 ft. above the river, having two centre openings 137 ft. 9 ins. span, and two land openings each 129 ft. 10 ins. between the supports; *BUILDER Journal*, 1856, xiv, 271-2, with woodcut of the bridges over the Sitter and over the Glatt; it is also described as having two centre spans 125 ft. 6 ins. wide; the others 119 ft. 4 ins.; and height above the mean water level 20½ ft. 8 ins., in *CIVIL ENGINEER*, etc., *Journal*, 1860, xxiii, 371, pl. 33; which p. 320-1 gives a summary of others erected on the Swiss lines, all taken from ETZEL, *Brücken und Thalübergänge Schweizerischer Eisenbahnen* (Bridges, etc.), fol., Basle, 1856, pl. 1-18. A bridge over the Enz, the Nagold, and the Wirm, at Pforzheim, by J. Naehrer, C.E.; *ALLGEMEINE BAUZEITUNG*, 1852, pl. 508-9; and *CIVIL ENGINEER*, etc., *Journal*, 1853, xvi, 232, pl. 21. A bridge over the Kinzig near Offenbourg, 210 ft. span; *ALLGEMEINE BAUZEITUNG*, 1853, pl. 567-71. Two bridges, side by side, over the Rhine at Cologne and Deutz or Kehl, are briefly described in *BUILDING NEWS Journal*, 1857, iii, 1219; *BUILDER Journal*, xviii, 349, with a view; xix, 204; and tested in March 1861. Rider's system of an iron lattice, *ALLGEMEINE BAUZEITUNG*, 1852, pl. 481.

HUMBER, *Practical Treatise*, fol., London, 1857, p. 94, illustrates the bridge over the Dershaw, near Berlin, consisting of six spans of 400 ft. each: p. 97, pl. 52, the bridge over Prescott-street and Goodman's-yard, Minorities, for the London and North Western Extension railway, by J. Baker, C.E., 118 ft. and 134 ft. clear span; 17 ft. 6 ins. deep: and pl. 48, the LATTICE GIRDER employed in the Chelsea Suspension bridge, by T. Page, C.E.

HUMBER, *Complete Treatise*, etc., fol., London, 1861, illustrates, p. 220, pl. 64-5, the Lerida bridge over the Segre, on the Barcelona and Saragossa railway, designed and contracted for by C. de Bergue and Co. of Manchester, having five clear spans of 131 ft. 2½ ins. each; its total length is 712 ft.: p. 223, pl. 66, the bridge over the Alcanadre, a centre span 213 ft. 3 ins. and two side openings of 65 ft. 7½ ins. each, by Señor don Pingdöllers C.E.: p. 225, pl. 67, the Murillo bridge, designed and contracted for by J. H. Porter of Birmingham, an ordinary road bridge, clear span 118 ft. 1½ in.: and p. 226, pl. 68-9, a bridge to carry the Unias e Industrias road over the river at Carlos Gomes near Rio de Janeiro, designed and contracted for by E. T. Bellhouse and Co. of Manchester, consisting of tubular girders with lattice webs, having two clear spans of 113 ft. 4½ ins. each.

BLOOD and DOYNE, *Investigation of the Strains upon the Diagonals of Lattice Beams, with the resulting formulæ*, paper read at Institution of Civil Engineers, *Minutes*, 8vo., London, 1851, xi, p. 1; BARTON, C.E., *On the Economic distribution of Material in the Sides of Wrought Iron Beams* (as the tube, Warren's, and the lattice, girder), 1855, xiv, 443; and *On Strains on Lattice Girders*, read at British Association, at Belfast, 1852, also by him. LATHAM, *Construction of Wrought Iron Bridges*, etc., 8vo., Cambridge, 1858. LES NOUVELLES ANNALES DE CONSTRUCTION, fol., Paris, 1864, (September).

LATTICE GIRDER. One of the methods, by which the flanges of a girder may be united, is trellis work of wrought iron bars rivetted together at their intersection, forming the combination known as the "lattice girder." A paper *On the Construction of Wrought Iron Lattice Girders*, by T. Cargill, C.E., is given in the *CIVIL ENGINEER Journal*, 1862, xxv, and xxvi; SHIELD, *Strains on Structures of Ironwork*, 8vo., Lond., 1861; RANKINE, *Manual of Civil Engineering*, 8vo., Lond., 1864, p. 559, 562, explains the computation of the stresses. The lattice girder has been usefully introduced in the construction of large roofs, as at the Royal Italian Opera house, Covent-garden in 1857-58 by E. Barry, A.R.A., described in the *Sessional Papers of the Royal Institute of British Architects*, 1859-60.

LAUBANISCH (URBAN), see GOERLITZ (C. VON).

LAUN (BENEDICT VON), see BENESCH (B.)

LAUNDRY OFFICES (The Fr. *buanderie* was the place

of the coppers for boiling lie etc. to be supplied to the *lavanderie* in which linen etc. was bucked). The department attached to a country residence, or to a large establishment, as a work-house, hospital, and the like, for the purpose of washing (It. *facendo il bucato, imbucando*) and finishing articles of clothing and the linen used for domestic purposes. This consists of a washhouse supplied with coppers for heating water and for boiling certain articles; washing troughs and wringing machines; an ironing room, sometimes called the laundry, containing the ironing boards, and a stove for heating irons; a mangle or other contrivance to smooth linen when in a damp state; and one or more frames or horses suspended with cords from the ceiling, on which to dry articles. Sometimes a hot or DRYING CLOSET, heated by the ironing stove, or by a hot water apparatus, is placed in, or adjoining to, the ironing room. A drying or bleaching ground (Ger. *bleiche, bleichplatz*), is attached wherever practicable, especially for the larger articles; and this is properly the Fr. *blanchisserie*, which term is now applied to a laundry where the cleansing of fine linen etc. (It. *bucatino*) is done.

A small washhouse within the house (if of large extent) is desirable for the use of ladies' maids and others; and where these persons have to do much clear starching, this accommodation is expected near their own room, in a spare bed, or other, room. KERR, *Gentleman's House*, 8vo., London, 1865, 2nd edition, 235-8. A well arranged plan, showing the requisite fittings, is given in PAPWORTH, *Ornamental Gardening*, 8vo., London, 1823, p. 87; previously given in ACKERMANN, *Repository of Arts*, etc., 8vo., London, 1821, xii, p. 249. The *Detached Essay*, Drying Closet, contains examples of stoves, horses, etc.; and p. 5, the arrangement of rooms. *Detached Essay*, Baths and Washhouses.

Huthnance's patent heating, purifying, and ventilating apparatus for drying rooms, and improved laundry stove and hot plate, manufactured by W. Pierce of Jermyn-street, is described in *BUILDER Journal*, 1862, xx, 241. The necessity of using water at 212° Fahr., to ensure disinfection and to prevent disease being carried into families by the supposed clean linen, was insisted upon by H. Helsham, M.D., at the Philosophic Institute, London, April 1865. A *blanchisserie* of three floors, showing the René Duvoir system, is given in DALY, *Revue Générale*, fol., Paris, 1844, p. 172-7, pl. 11.

LAURA. "The fervent monasteries of Egypt, Palestine, and Syria, were surrounded by a *laura*, a distant circle of solitary cells": SUICERUS, *Thesaurus Ecclesiasticus*, fol., Amst., 1682, ii, 205, 218; THOMASSIN, *Discipline de l'Eglise*, fol., Paris, 1679-81, i, 1501-2, gives a long account thereof. When Gerasimus founded his monastery in the wilderness of Jordan, it was accompanied by a *laura* of seventy cells; GIBBON, *Decline and Fall*, etc., 8vo., Lond., 1854, iv, 127. HERMITAGE.

LAURANA (LUCIANO), see MARTINI (L.)

LAUREL, see LAURUS, the bay tree.

LAUREL OIL. It has been stated (*BUILDER Journal*, 1856, xiv, 413), that the meat market at Ghent, when painted with laurel oil, became completely free from flies, the smell being intolerable to them; it is not unpleasant and is easily to be passed over. A strong decoction of laurel leaves is made by filling a large copper with leaves, adding as much water as possible, and boiling them for four or five hours; if this liquor be applied boiling hot to floors infested with fleas it will utterly destroy these insects. It is best to apply it when repairing, as the ceiling under the floor will probably get discoloured by the liquor; as much as 60 or 70 gallons were used for one house; BAKER, in *BUILDER Journal*, 1862, xx, 862.

LAURENT (LE SIEUR . . .) added some embellishment to the church of S. Sulpice at Paris, erected 1733 by Servandoni; and proposed to add a chapel on the exterior of the lady chapel on the right hand side; BLONDEL, *Arch. Franc.*, fol., Paris, 1752, ii, 39.

LAURENT (GERMAIN) *prébat*, designed 1501-3 his abbey

church of S. Michel at Tonnerre; the receipt of a fac-simile of his signature is acknowledged in the *COMITÉ HISTORIQUE, Bulletin*, 8vo., Paris, 1843, ii, 726.

LAURETI or LAURETTI (TOMMASO) of Palermo, whence he is also styled Tommaso Siciliano, was a pupil of S. del Piombo. He designed 1563 the fountain in the piazza Maggiore or del Gigante, at Bologna, executed by A. Lupi, but the figures by Giovanni da Bologna; MALVASIA, *Pitt. di Bologna*, 12mo., Bol., 1766, p. 178; ZANOTTI, *Storia*, 4to., Bol., 1739, lib. 2, i, 280. The COMMISSION ROYALE DE L'HISTOIRE DE BRUXELLES, 8vo., Bruxelles, 1848, xiv, 558, notices that the inscription in BLAEU, *Nouveau théâtre d'Italie*, fol., Amsterdam, 1704, ii, pl. 13, is "Inventor et architectus fuit Thomas Lauretus Panormitanus. *Æreas statuas fecit Joannes Bologna Belga*;" and DE ROMBISE, *Itinerarii per diversas Gallias*, etc., Mons, 1639, p. 42, states that this fountain was executed by J. Strada of Bruges. Laureti also built 1561, near the upper end of the Strada del Monte, the octagonal reservoir called the *bagni di Mario*, to collect and purify the water for the fountain; 1565 the fountain in the side wall of the palazzo pubblico, LANDI, *Pal. di Bologna*, fol., Bologna, n. d., pl. 30; the "truly stupendous palazzo pontificio Lambertini", MALVASIA, p. 328 (that now called Ranuzzi was designed by B. Triacchini, BIANCONI, *Guida*, 8vo., Bologna, 1826) who, p. 93, says Laureti designed the Bianchetti chapel in the church of S. Giacomo Maggiore; and p. 92, 95, 99, 100, and 147 notices the paintings by this artist in various chapels in Bologna. He became the president of the Academy of S. Luke at Rome, where he died, aged about 80 years, having been employed by Gregory XIII (1572-85) for whom he did the paintings above the cornice of the Hall of Constantine in the Vatican (according to BONANNI, *Hist. Templi Vat.*, fol., Rome, 1696, p. 227), as well as by later popes. He is called Laurati by error in VASARI, Bohn's edit., 1850-52, iv, 75. 5.

LAURITZ DE THURAH, see THURAH (L. DE).

LAURUS NOBILIS (It. *alloro*); the laurel, or sweet bay. A native of the north of Africa, and the south of Europe and of Asia. It attains a height of 20 to 30 ft., and is cultivated in gardens on account not only of its elegant appearance, but also for the aromatic fragrance of its leaves, which are evergreen, lanceolate, wavy at the margin, and quite smooth. Its berries are small, ovate, and of a dark purple colour. The laurel was dedicated by the ancients to Apollo. The leaf has been much used in ornamental sculpture; the outside of the dome of the choragic monument of Lysicrates at Athens is delicately wrought in imitation of a thatch or covering of laurel leaves; STUART and REVETT, *Antiquities*, fol., London, 1762, i, 29. The laurel was also used in triumphal processions, and worn by emperors, conquerors, and poets, in garlands and wreaths; of the latter there is a good example sculptured in the frieze of the choragic monument of Thrasylus at Athens, given in the same work. The berries are also frequently introduced with the leaves. Examples in sculpture are represented in PIRANESI, *De Romanorum Magnificentia*, fol., Rome, 1761. 6. 15.

LAURUS INDICA or royal bay, is a native of the Canary islands. The wood, of a yellow colour, is not heavy, but well suited for furniture. It is called *vignatico* in the island of Madeira; and is probably what is imported into England under the name of Madeira mahogany, but it is less brown than mahogany. "Canary wood", a native of the Brazil, Para, etc., is known at the Isthmus of Darien as *amarillo*; and *vantatico* and *vignatico* corrupted from *vinhatico*, a Portuguese name for several yellow woods, besides that sent from the Brazil under the same name. It is imported in round logs from 9 to 14 ins. in diameter, and sometimes in squared pieces. The wood is of a light orange colour; generally sound; straight and close in the grain; it is used for cabinet work, marquetry, and turnery. 71.

LAURUS CHLOROXYLON, GREENHEART, is also called cogwood. 71.

Several species of LAURUS in the woods of Nepal and Tavoy furnish excellent wood of large size for carpentry, etc. 71.

LAURUS SASSAPARA, a native wood of the southern portion of the United States, not strong, but when stripped of its bark it resists decay for ARCH. PUB. SOC.

a considerable period; and is therefore used for posts and rails, and for joists and rafters in timber houses; it is said to be free from the attack of worms and insects on account of its odour. The older trees are from 15 to 18 ins. in diameter.

LAURUS CAROLINIENSIS or red bay, is a native of the same locality. The wood is of a fine rose colour, and strong, with a fine compact grain; being susceptible of a brilliant polish, it furnished the material for furniture in the Southern States before mahogany prevailed; but the dimensions of it are small. It is used in the upper parts of vessels with the red cedar; MICHAUX, *North American Sylva*, 8vo., Philadelphia, 1817.

LAUSANNE. The capital of the canton Vaud in Switzerland. As it is irregularly built on three hills and several intervening valleys, many of the streets are very steep, and in the older part of the town are narrow and not well built, but some good ones have lately been formed. Two of the hills are united by the *grand pont* or *pont Pichard*, as it is called from its builder, 582 ft. long, 33 ft. wide, and 80 ft. high. The cathedral dedicated to the Virgin, is considered to be, internally, the finest building of the sort in the country. It was founded 1000, but only a few traces of the original edifice remain in the lower groined arcades behind the altar. The present building dates from 1275, (1235-75?) and is of the transition from the First to the Middle Pointed styles; a plan is given in WIEBEKING, *Baukunde*, fol., Munich, 1821-6, pl. 22. The nave piers are most remarkable and peculiar, consisting of a group of two or four detached shafts or columns, two



Fig. 1. Perspective views of the nave piers of the cathedral of Lausanne.

larger and two smaller, from the capitals of which spring the arches of the clearstory walls. There are two west towers, the south one having a spire 200 ft. high; two low square towers, one to each transept on the east side; and a remarkable west porch or galilee with a bench table: the west *portal* is given in MORET and CHAPUY, *Moyen Age Pittoresque*, fol., Paris, 1837-40, pl. 148. The magnificent geometrical traceried rose window, about 26 ft. in diameter, in the south transept, is given in VILLARD DE HONNECOURT, *Fac Simile*, etc., edit. by Willis, 4to., London, 1859, p. 99, pl. 30 orig., and pl. 72 in detail as executed. The old stained glass was removed to Berne cathedral; and the high altar sold. In 1825 the central tower was struck by lightning, and the spire was burnt with part of the stalls; the remainder dating 1509 were then removed with the *jubé* to the castle of Chillon. The church of S. Francis is an old structure.

Near the cathedral is the old castle, a massive square building

with turrets at the angles, originally the residence of the bishops of Lausanne, but now converted and modernised for the public offices of the canton. The college founded 1537 with its cantonal museum; the penitentiary established 1822-8 and considered a model of its kind; the theatre; the blind asylum; and the normal schools; the cantonal library having over 33,000 volumes; the charity schools, a modern structure; the casino or club-house; and the prisons, formerly the archiepiscopal palace, are the other important buildings. WEBB, *Eccelesiology*, 8vo., London, 1848, p. 574-5; BLAVIGNAC, *Histoire d'Architecture Sacrée du IV^e au X^e siècle*, 8vo. and fol., Lausanne, 1853-4, does not illustrate the buildings in this town. 14. 28. 50.

LAVA. The general designation of the mineral substances that have been ejected in a melted state from volcanic vents. The certainty with which these mineral ingredients can be identified, depends principally on the degree of crystallisation which circumstances have permitted, and this on the rate of cooling and pressure to which the melted masses have been subjected. There is in lava every degree of variation, some being granitic, others of earthy, compact, resinous, or vitreous texture. Of the lavas BASALT is the most homogeneous, the most perfectly melted, and the most compact. Lava must not be confounded with TUFFA, volcanic sand, etc. PUMICE STONE.

The lava from the extinct volcanoes of the Puy-de-dôme, which has been used since the thirteenth century, but hitherto only employed for architectural purposes in the basin of the Limogne, has been extensively used (before 1860) in Paris for foot pavements, street inscriptions, and panels for the rich enamels by the process of M. Mortelèque. The comte de Chatrol, by the useful instructions and remarks published by him, has been one of the chief promoters of this branch of decorative art, and he has founded at Volvic a school of design and architecture to develop the lava works of the Puy-de-Dôme; at Semur also, M. Larribe has instituted a school and museum for workmen. The stone is porous, resembling trachyte, and contains specular iron in its cells; it is easily worked, the bed furnishing blocks 20 ft. by 6 ft. in size. Many of the houses and the churches at Clermont-Ferrand and Riom are built of the dull grey lava of Volvic, found two and a quarter leagues from that town; the white mortar joints are very disagreeable, and the buildings are usually lime whitened to give a more cheerful appearance: the *halles aux toiles* in the former town, built 1821, contains a hundred and sixty columns of it, each 12 ft. high in one shaft. It was used for water pipes in Paris in 1821. At Aderno in Sicily, the columns of the façade of the church are of lava; and at Catania it has been much used for building even in Roman times. Black lava of Sorrento, in Naples, was used for staircases, window and door dressings, etc. BRARD, *Minéralogie*, 8vo., Paris, ii, 50; 264.

Ornaments are made at Naples of various coloured lavas, as red, green, grey, yellow, mottled, etc. A very large block of lava was sent to Chatsworth for the late duke of Devonshire, as a pedestal for a statue.

"Enamel painting on enamelled lava is alone suitable for exterior ornamental pictures"; HITTOFF, *L'Architecture Polychrome*, fol., Paris, 1851, p. 741; BUILDING NEWS Journal, 1860, vi, 5-6.

Gas burners made of a close grained and firm lava, admitting of being turned, polished, and bored, were introduced in 1855 to supersede those of metal which became corroded; they did not, however, continue long for sale; BUILDER Journal, 1855, xiii, 371.

LAVABO, see LAVATORY.

LAVACRUM. A word used by classic authors for a place for washing, in all probability as distinguished from the bath. AULUS GELLIUS, i, 2, speaks of *lavacra* as cool places for rest (refrigerantibus lavacris) after a long walk; it may be gathered from CLAUDIAN, *Eutrop.*, 410, that they were often splendidly fitted up. It is not impossible that the word "labrum" may be a corruption or contraction of this word. *Detached Essay*,

Baths and Washhouses. The *It. lavacro* is almost absolutely a laver.

LAVAGNA STONE, or *Pietra di Lavagna*. The chief quarries in Italy supplying slates are situated at S. Giacomo near Lavagna, not far from Genoa, where there are about a hundred and fifty worked in the eocene rocks. The slate is employed for roofing; for ceilings, slabs of about a yard square being laid on beams or joists and afterwards plastered; and for slabs, etc. From being used polished it has there received the name of 'poor man's marble.' Slates are also obtained from the oolitic beds at places near Seravezza. INTERNATIONAL EXHIBITION 1862; Kingdom of Italy; *Catalogue*, 8vo., 1862, p. 61; BUILDER Journal, 1862, xx, 924. Many pictures in S. Peter's church at Rome were painted upon this material. 5.

LAVALLÉE (JEAN DE), son of SIMON, was born in 1620. He was in the service of Charles X (1654-60) and Charles XI (1660-96) of Sweden, and gave the plans for the old royal château at Stockholm, burnt 1697; designed 1665 the tomb of king Charles X in the church of Riddarholm; and constructed the hôtel of the freemasons at Stockholm. He died in 1696. MOLRECH, *Breve fra Scerriage, Letters from Sweden in 1812*, 8vo., Copenhagen, 1814-17.

LAVALLÉE (MARTIN DE) is noticed as inspector of royal buildings to queen Christine. J. Marot, H. David, and others, engraved after his drawings. 69.

LAVALLÉE (SIMON DE) or S. de la Vallée, of France, was invited to Sweden by queen Christine (1632-54). He designed at Stockholm the Riddarhuset or palace of the order of nobility, commenced 1648, and finished 1680 by his son; built the churches of S. Hedwig-Eleanor and of S. Catherine; and is said to have made the plans for the church of S. Mary. WEINWICH, *Dansk og Svensk Kunstner Lexicon*, 8vo., Copenhagen, 1829, states that he died in 1643, but this is evidently an error. DUSSEUX, *Artistes Français*, 8vo., Paris, 1856, p. 447, 449; EKMARCK, *Guide de l'Étranger dans Stockholm*, 8vo., Strengnäs, 1830, p. 280.

LAVATORY. The term generally used instead of LAVER, for the place in a cloister at which the brethren washed before they proceeded to their meals. It seems generally to have been placed on the south side, sometimes within the cloister and sometimes without; and sometimes at the entrance to the refectory, which was often entered from an alley of the cloisters. It consisted of an immovable metal or stone basin, sink or trough (late Lat. *lavatorium*, *lotorium*; *It. lavatoio*; *Fr. lave-main*, *lavoire*), frequently adorned with rich architectural decoration, as mentioned subsequently. The water was laid on, according to the COTTONIAN MS., *Otho*, c. xi, fo. 51. vo. which states that the "plumbarius" or "conductarius" at Westminster abbey was to have half a marc of silver per annum and the corrody (*i. e.*, the allowance of food and drink) of a monk, for keeping the lavatory in repair. The same MS. gives curious regulations for the monks' ablutions, the number of towels to be provided, etc. CONDUIT; FOUNTAIN; LAVACRUM. A. A.

According to circumstances the lavatory of a monastic establishment might be either a long stone trough; a semicircular, or circular, sink, which formed the mouth of a well, or was placed near to one; or a fountain, sometimes forming a separate structure in the courtyard: indeed, VIOLET LE DUC, *Dict.*, s. v. *lavabo*, enlarges the definition to a basin acting as a cistern and delivering water by spouts to a larger one serving as a sink; such as one, of the twelfth century, which was removed from the abbey of S. Denis into the centre of the second courtyard of the école des beaux arts at Paris.

Of the first shape, is the 'laver' in the sacristy at York cathedral, CARTER, *Ancient Architecture*, fol., 1795-1807, pl. 60, pt. 1; in the west cloister at Norwich, pl. 23, pt. 2; at Kirkham priory, close of the thirteenth century, situated on the west side of the cloisters, PROUT, *Relics*, 4to., London, 1812; and at Worcester, where the stone work dividing it is perforated to permit communication; a long stone lavatory

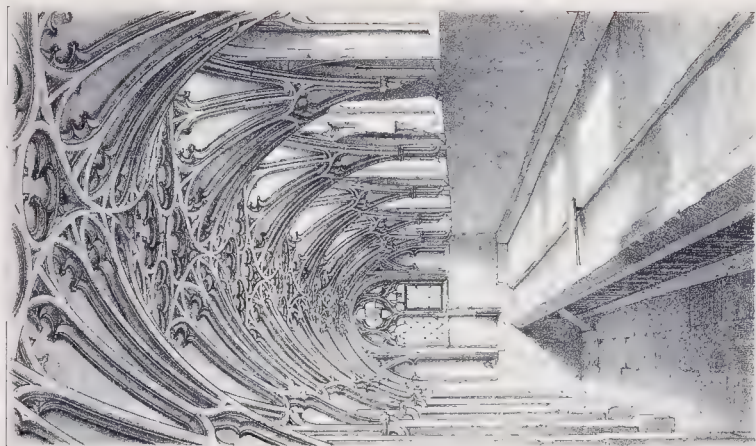
PLATE I



Interior of the Cathedral of St. Peter, Rome.

Interior of the Cathedral of St. Peter, Rome.

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Interior of the Cathedral of St. Peter, Rome.



was placed in the north walk of the cloister at Gloucester, but in the south walk at Chester, Wells, and Westminster. In the centre of the quadrangle of the cloister at Durham, there are the remains of an octagonal fountain probably built 1432 over a spring; and in a similar situation at Wells is a walled space about 6 ft. 6 ins. wide and 19 ft. long, open at the top and approached by steps; a stream flows through it; CARTER, pt. 1, pl. 43, figs. r, v, w. Near the lavatory is often found a long aumbry for towels. The plan of Christchurch, Canterbury, compiled by the monk Eadwin in the twelfth century, now preserved in the library of Trinity college, Cambridge, and published in the *VETUSTA MONUMENTA*, exhibits a lavatory in the cloister. The *lacabo*, with rich decorations over it, in the cloisters at the abbey of S. Wandrille, near Caudebec, in Normandy, is given in DALY, *Revue Générale*, xiv, p. 315; and in RAMÉE and CHAPUY, *Le Moyen Age Monu. et Arch.*, fol., Paris, 1840-44, ii, pl. 221, it belongs to the sixteenth century. The Italian *lavabo* of large size and architectural design, in Macigno stone, dating about 1490, called the joint work of Benedetto da Rovizzano and J. Sansovino, which was formerly in a house in the via degli Archibuscieri at Florence, is now in the South Kensington museum; it is believed to be the work mentioned by VASARI, s. v. Benedetto.

Small basins of stone, similar to a piscina in churches, were often placed behind (or "in the screens" as usually said, at) the entrances to ancient dining halls, with cisterns of water, an example of the two existing in Battle hall, Sussex, is given in TURNER and PARKER, *Domestic Arch.*, 8vo., London, 1853, ii, p. 46; a niche with a hook in Little Wenham hall, Sussex, is in iii, 51. WATER DRAIN.

The area, and the room, in which the supply of water was used, have received the name of lavatory by extension, like *lavabo*; of which term VIOLETT LE DUC, *Dict.*, s. v. remarks that it most frequently meant a room which projected into the garth from one side of the cloister, or from the junction of two of the alleys nearest to the refectory, in almost all monasteries; that such a room was an important feature in such establishments, and (even in the twelfth century) especially in those of the Cistercian monks; and that this accommodation was removed (particularly in the south of France and in the Peninsula) before the end of last century, because the monks then ceased to wash in common. According to this author the hexagonal room, 10 ft. in radius, at Thoronet, has lost its basin, while the latter deprived of its shelter is seen at Pontigny: and he gives a restoration of a room, about 25 ft. square, with a fountain at Fontenay. The *lavatoio* in the Certosa della Beata Vergine delle Grazie near Pavia, offers a specimen of decoration by means of ultramarine and gold.

LAVATORY (late Lat. *lotorium*, for *lavatorium*, as in ROR. CLAUS. 29 Henry III). The name for a washingroom in a house, being an apartment where the upper part of the human body is washed; while LAUNDRY is the term for the washhouse or place for cleansing the linen, etc., which has been applied to the body.

In modern private houses the lavatory for washing hands has generally a stand with a polished marble, or enamelled slate, top in which one or more basins are sunk, with places for soap, nail-brush dishes, etc. Hot and cold water are laid on, and at the bottom of the basin is a waste pipe. In many instances all these pipes act on pressing brass studs, fixed in the marble, marked respectively "hot", "cold", "waste"; but these though very neat are apt to get out of order; and it is more common to lay on the water by "butler's pantry" cocks, or by plated "fall down lever basin" cocks with handles, which turn down like the cocks to tea-urns, the water escaping by a common washer and plug to a waste pulled up by a chain. Pegs to hang up hats and coats, with towel horses, should also be provided. The space under the marble top is generally enclosed with frames and doors, and has shelves for combs, brushes, etc. In general the lavatory leads to one or more water-closets, and in large establishments also to one or more urinals. A. A.

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Lever cocks are often inconvenient (where they project over a basin of the usual size to prevent drip and splash) to persons washing: therefore stop-cocks at the back of, and placed on, the table with a short length of pipe turned into the basins are suggested: spring thumb cocks at the end will prevent waste of the water.

This modern use of the word lavatory, includes much more accommodation in some cases than in others: it is no longer the simple *lavatorium* of mediæval times, but now comprises in one apartment their *balneum*, *camera* (dressing-closet), *latrina*, and *lavabo*: it is now a room containing the usual appliances for washing, with perhaps a bath and a water-closet, common to the male inhabitants of a mansion and useable by more than one person at a time; whereas the dressing-room, with or without these conveniences, is reserved for the private use of an individual. In a large nursery more than one bath may be placed in the lavatory. An extensive range of basins, sinks, or troughs, is needed in the lavatory of a large school or other establishment where many inmates are to wash simultaneously: it may be observed that not only therein, but in private houses, the level of the water in the vessel is generally far too much above the floor; if the top of the vessel be about an inch above the middle of the average height of the child or person using it, less strain will be required and the ablution is likely to be more complete. In a country residence the lavatory is the proper place to change wet clothes for dry ones, and convenient for the first attention of the surgeon in case of accident; it should, therefore, always be near an entrance, have a wide door and a fireplace, and be provided with a safe when the floor is of wood. The floor is sometimes covered with battens laid in moveable frames, where much splashing takes place, to avoid standing in the wet.

LAVATORY. A paved room, belonging to a dead-house, in which a corpse that is to be examined is kept under a shower of some disinfecting fluid on a sloping table of stone or slate. The use of the Fr. *lavatoire* seems to be restricted to the sink in which the body, as soon as it became a corpse, was washed and left until the time came for it to be placed on the bier: a representation of one is given in VIOLETT LE DUC, *Dict.*, s. v. *lavatoire*, as taken from LEBRUN DE CHARMETTES, Sieur de Moléon, *Voyages Liturgiques*, 8vo., Paris, 1718, p. 151, fig. 12, who noticed that there were such in the town-hospital and a chapel of the abbey of Cluny, in the chapter-house at Lyon, in the vestry of the cathedral at Rouen, and in almost all monasteries belonging to Cluniac and Cistercian monks. The present exceptional practice of washing a corpse is older than the time of the Apostles, and was continued until the end of the last century in the Basque country; as well as in the neighbourhood of Avranches, and in the Vivarais, in France.

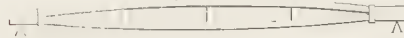
LAVELLO. An ancient town in the province of Basilicata, nine miles north-east of Melfi, in Italy. It is the see of a bishop, and contains a cathedral dedicated to S. Mauro, and two convents. 50. 96.

LAVER. The old English term, preserved in the authorised translation of the Holy Scriptures (Exodus, xxx, 18; I KINGS, vii, 23; and II CHRONICLES, iv, 2), for a vessel intended for the purpose of lustration rather than of ablution. Such a species of LAVATORY was the 'sea' made of brass and carried on the backs of brazen oxen, which stood in the second court in the Jewish temple; CANINA, *Tempio di Gerusalemme*, fol., Rome, 1845, pl. 12, has given a clever indication of his idea of the design of this work. As in the Jewish temple there was this brazen vessel for the purposes of purification, so there was generally a fountain in the atrium in front of the Christian basilica: CANINA, *Tempi Cristiani*, fol., Rome, 1846, pl. 17, showing the atrium of Sta. Agnese sulla via Nomentana; and NESBITT, *On the Churches at Rome earlier than the year 1150*, in the ARCHÆOLOGIA, 1867, xl, pt. 2, p. 201. The fountain in the parvise of a church seems to have been suc-

ceeded by a large vessel for holy water, generally placed inside the door, sometimes as at Como on the back of some animal. In northern Europe the stoup was used for this purpose, and was commonly in the porch.

A. A.
LAVERNEDA (NICOLÒ) restored that palazzo Durazzo situated next to the one at the north-east corner of the strada Balbi, at Genoa, built by B. Bianco; *MANUALE DI GENOVA*, 12mo., Genoa, 1846, p. 359.

LAVÈS'S TRUSS. A system of trussing a beam, invented by Herr Lewis Lavès, architect to the king of Hanover, as published in a pamphlet, *Mémoire explicatif d'un nouveau système en constructions*, 4to., Havre, n. d. (cir. 1839); explained in a communication to the Royal Institute of British Architects 16 March 1840, and printed in the *CIVIL ENGINEER Journal*, iii, 161-2. The object is to secure the greater part of the material at the upper and lower edges of a beam in order to obtain the greatest strength. For this purpose the beam is cut nearly from end to end, and bound at each termination with an iron strap. Blocks or little posts are then driven into the cut, separating the severed pieces to several inches distance in the middle of the length, thereby throwing the material farther above and below the line of neutral axis. A trial was made with a solid beam 40 ft. long, $9\frac{1}{4}$ ins. deep and $7\frac{1}{4}$ ins. wide, which on being gradually loaded deflected $5\frac{1}{2}$ ins. with a load of 1,700 lbs. When it had been cut to within $3\frac{1}{2}$ ins. of each end, the upper part being 5 ins., and lower part $4\frac{1}{2}$ ins., deep, and then separated until they were as wide apart as half the depth of the beam, it suffered a bending less than in the former condition by $1\frac{3}{4}$ ins. The slit being opened equal to the whole depth of the beam, $9\frac{1}{4}$ ins., it deflected $2\frac{1}{4}$ ins., or



3 ins. less than the first condition; the slit was then widened to $13\frac{1}{2}$ ins., or equal to a depth of one and a half of the beam, and it only deflected $1\frac{1}{4}$ ins. To obtain the greatest gain of strength, the cut should be made so as to give a section to the upper and lower parts, proportional to the power of the material to resist tension and compression. For bridges it will be sufficient that the versed sine of the lower arc equal $\frac{1}{16}$ or $\frac{1}{8}$ of the span: this is very moderate, for a beam requires $\frac{1}{16}$ or $\frac{1}{8}$ of the span; and bridges or arches of masonry or solid construction, a rise of $\frac{1}{16}$ of the span.

Up to 1840 Lavès had constructed on this plan, an oak bridge at Hanover for foot passengers, 100 ft. span, 12 ft. wide, at a cost of £112: an oak bridge over the Nette river at Derneburg, near Hildesheim, 60 ft. span, 15 ft. wide, for carriages, cost £70: another at the same place: one in fir over the Eger at Elnbogen in Bohemia; another over the Eger at Altsattel in two lengths: one for carriages in wrought and cast iron in the royal park of Herrenhausen near Hanover; besides others at Salzau, near Kiel; one in the royal park at Hanover; and one for count Munster at Derneburg.

The application of this system to roofs and floors is extremely economical and useful: from its vertical pressure it requires no other support than walls of moderate thickness: the principal rafters of a roof may derive considerable strength from being thus treated. Lavès applied it to a roof in iron over the kitchen in the royal park at Hanover; one in timber 50 ft. span to a barn at Wangenheim, near Gotha, for the baron of Wangenheim; one at Hersum, near Hildesheim; and one of 38 ft. over the scenery store of the theatre at Hanover. It has also been applied to LADDERS of a great length.

The SURVEYOR, ENGINEER, etc., *Journal*, 4to. Lond., 1840, i, p. 101, notices the model of an iron bridge on view at the Polytechnic Institution by Herr Lavès, of which it gives a plan and elevation. It also notices that the younger Smeeaton had employed a modification of the same principle in 'trussing the beams and girders of the new warehouses at the London docks, enabling him to dispense with every second pillar, and

to make the pitch of the roofs lower, and other improvements. At pp. 224 and 249 Lavès's system is thoroughly explained with two plates of diagrams, probably taken from his pamphlet above mentioned.

LAVERO DI COMMESSO, or Opera di Comresso, see FLORENTINE MOSAIC.

LAW of Building, etc., see BUILDING LAWS; and JURISPRUDENCE (ARCHITECTURAL).

LAW COURT. A structure designed expressly, or arranged permanently, for the accommodation of the public, the parties in a case with their advisers and any witnesses, and the officials, during the sittings of a tribunal for the administration of criminal, or civil, justice.

The Law Courts in the county towns of Great Britain and Ireland are isolated public buildings containing generally the following accommodation, as provided in those for Cambridge designed by Messrs. Wyatt and Brandon, as noted hereafter; The *Crown Court*, judges' room with private entrance and conveniences, robing room for counsel, grand jury room and box, with water closet, and waiting room for witnesses: the *Nisi Prius Court*, robing room for counsel, petty jury room, waiting rooms for witnesses; the Clerk of the Peace Office, record office, strong room, etc.; and a large public entrance hall. A staircase leads to the basement, which contains a gaolers' room with prisoners' cells, etc., communicating by a subterranean passage with the county gaol adjoining.

In London it is now deemed desirable to combine in one building the numerous superior law courts hitherto situated in several localities of the metropolis, and to provide more extensively for the accommodation of all parties resorting to them. The following abstract shows the demand accordingly made by the COURTS OF JUSTICE COMMISSION, *Instructions for the competing architects*, 1867: the numerals are employed to signify the number of apartments (exclusive of lavatories and water-closets) in addition to the public court-room.

The *Equity Courts* comprise one for the lord chancellor, with 3 rooms for counsel, counsels' clerks, and attorneys, and 13 others; one for the lords justices, 6; one for the master of the rolls, 13; one for each of the three vice-chancellors with a spare court, 7 each; 6 rooms for counsel, counsels' clerks, and attorneys; a library, with four sets of 22 as chambers for the equity judges; and two small courts with retiring rooms: with the accommodation requisite for the several offices or departments; viz., registrars, 66; taxing-masters, 44; accountant general, 24; record and writ and report, 11; petty bag, 3; examiners, 8; enrolment, 6; masters in lunacy, 12; visitors in lunacy, 7; registrar in lunacy, 5; and solicitor to the suitors' fund, 3.

The *Common Law Courts* comprise three for the queen's bench and 50 rooms; three for the common pleas, 44; three for the exchequer courts, 44; exchequer chamber, 5; spare court, 26; another spare court, 20; a public hall and prisoner's room, with three sets of 6 as chambers for the judges of those courts; with the accommodation requisite for the several offices or departments; viz., queen's bench masters, 30; common pleas masters, 30; exchequer masters, 30; queen's bench associates, 3; common pleas associates, 3; exchequer associates, 3; crown office, 7; queen's remembrancer, 10; circuit associates, 10; and registry of acknowledgment of deeds by married women, 3. The *Probate, Divorce, and Matrimonial Causes Court* and 16 rooms; with the accommodation requisite for the several offices or departments; viz., registrars, 14; seats and correspondence, 19; personal application, 5; clerk of the papers, 4; divorce, 6; record keepers, 50, with 350,000 cubic feet of fireproof stowage; inland revenue, 10; receiver of wills, 5; and sealer, 5. The *Admiralty Court* and 15 rooms, with the accommodation necessary for the department, viz., registrars, 21; record rooms, 10; and marshal, 6. The *Ecclesiastical Court* and chambers, 14; with 12 others as offices of the registrar. The *Appellate Court* (which may be used by the judicial committee of the privy council) and 21 rooms. The *Crown*

Officers' rooms, 7. The *Bankruptcy Court* and 28 rooms. The *Land Registry* offices, 33. The *Registry of Judgments* and other proceedings affecting land, 4. The *Middlesex Registry*, 27. The *Royal Commission on matters connected with the law*, 11. The *miscellaneous accommodation*, comprises a large room for the bar; general library for the bar and the attorneys; robing, refreshment, arbitration, and sale, rooms for the bar; rooms for printing and exhibiting cause lists; shorthand writers and reporters, 4; refreshment and kitchen for all classes; office attendants; sale of stamps, cause lists, and stationery, 4; writing room, post, and telegraph, 3; police; inquiry; lost property; cloaks; firemen and engine; ticket porters, commissioners, and shoeblacks; workshops; foreman or clerk of the works; with sufficient lavatories and water-closets of two classes; dust-bins, and coal-cellars; gas-meter; and furnaces. The housekeepers' dwellings are to be detached.

As a sample of the accommodation required in detail, the *Eschequer court* was to comprise a banco court to be 1,376 ft. super. in area; a judges' robing room 500; vestibule for wardrobes 200; three judges' retiring rooms each 576 and lavatories and water-closets; room for hearing summonses 240; waiting room 168; room for masters, with five wardrobes 432; ditto for clerks 168; ditto for queen's remembrancer 168; ditto associates 168; jury room 400; jury waiting room 400; plaintiffs' witnesses' rooms (males) 400; defendants' ditto 400; plaintiffs' ditto (females) 224; defendants' ditto 224; judges' clerks' room 400; retiring room for ditto 168; usher and court keeper's room 168; messengers' room 168; with lavatories and water-closets. Three rooms for counsel and for consultations one 320 and two 168, and one for counsel's clerks 192, with six for attorneys and for arranging causes coming on, altogether 1,140, and lavatories etc., were required in addition to the two other or *Nisi Prius* courts and their fourteen rooms. The Queen's Bench court specially required a room for the grand jury, with retiring room, lavatory, etc.; cells for prisoners; room for turnkey, etc.

The accommodation is to be provided, and the arrangements are to be adopted, so as in the greatest degree to facilitate the dispatch and the accurate transaction of the law business of the country; the first object should be to provide ample uninterrupted communication and accommodation for those who have legitimate business in the building. The arrangement of the courts and offices is of vital moment; almost every room throughout the building, being devoted to purposes of writing or reading, will necessarily require the fullest extent of light which can be obtained. A necessity of almost equal urgency is quiet. The courts must be removed as far as possible from all street noises, and carefully guarded against the admission of noise from internal areas, corridors, and staircases. The construction of floors, particularly in that part of the building devoted to offices, as well as in corridors and passages near the courts, should be specially adapted to prevent noise.

Methods of avoiding defective internal arrangements are suggested; such as 1, those conducting the business of the courts should not have to pass through or across the part of the court in which the business is being transacted in entering or leaving it. 2, movements of parties, witnesses, etc., in and through the courts, should be so masked as to exclude noise. 3, there must be easy and convenient means of ingress and egress for witnesses, for parties engaged in the causes, their counsel and attorneys; and convenient means of communication between the parties and their advisers. 4, there should be no spaces in, and not separated from, the court where persons can collect and talk to the disturbance of the business; all such nooks are objectionable, while all such, if quite outside the court, and if comfortable, are very advantageous. 5, the accesses to the courts for mere public spectators should be entirely distinct from all the other accesses, and as far as possible from each other, and should enter directly from the street, and never cross on a level or communicate with the accesses

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and passages used by the profession, witnesses, jurors, and others engaged in the business of the courts; so that, while spectators may be readily admitted to each court separately, they should not, for the purposes of mere sight seeing, be tempted to pass from one court to the others, and to make the round of them. If groups of courts be reached from one corridor it will be desirable that separate ways of ingress and egress should be provided from the street. And 6, galleries or other portions of the court set apart for the public should have comfortable seats to see and hear what is going on; all of them having backs and perhaps being divided by arms; no standing room is to be allowed.

The general accesses should be made as exclusively as possible for those engaged in the courts or offices, and not be public thoroughfares. To those offices which transact a large amount of business with the public, accesses (and staircases where advisable) should be provided for the public distinct from those for the officials, and these accesses and staircases should open into the street on the one side and into the interior of the buildings on the other. Separate doors for egress and ingress are also very desirable. Different sets of offices which are in frequent communication with each other, and which it may nevertheless be impossible to place in close contiguity, should have special means of communication by corridors, staircases, or balconies, as may be most convenient. Where sets of offices are subdivided, the inconveniences of separation must be reduced to the lowest point. Speaking tubes, shoots, and lifts for papers, telegraphic communication, etc., must be provided. The facilities of communication afforded to departments associated together must not be a source of disturbance to other suites of offices; a general corridor, for example, running through and down the middles of all the suites of offices would be a cause of great inconvenience. Outside balconies, merely carried past certain departments, or continued throughout, and connected from floor to floor by turret staircases, might be devised.

The building must be fireproof; with a supply of water in case of fire. Portions of the building must be arranged to be shut off in case of fire and as a security against robbery. Every court and department must be so arranged as that it can be shut up on cessation of business or during its vacation without interfering with the access to the others.

Good arrangement for the acoustic qualities of all apartments in which arguments are to be heard is essential; and also ample ventilation. Good arrangements for water-closets and urinals conduce to the salubrity and completeness of the building; they should be attached to, and yet outside each of, the different groups of courts and offices requiring them; with ventilation to the open air, such ventilation being separated from any internal areas, up to the roof of the building. Water supply, sinks, lifts for coals, and shoots for dust, etc., are to be arranged in convenient positions as may best conduce to the facile discharge of the duties of the housekeepers and their attendants: lifts for large models to be produced in court, and for infirm persons, should be provided. Open fireplaces are to be used in all the offices, and as far as may be in the witness, waiting, and other such rooms; a general system of heating by hot water or otherwise may be desirable.

The refreshment department is an important part of the general scheme, and requires separate rooms for the use of the judges, officers, and clerks of the several courts and offices; for the bar; and for attorneys, clerks, officers, jurors, witnesses, and others engaged in the causes; those for officers, witnesses, and jurors should be first and second class; and there must be rooms for female witnesses to meet the case of indisposition; as well as separate retiring rooms for females attached to the refreshment department.

The height of the rooms used for the purposes of regular daily work is, as far as possible, to be not less than 14 ft.: in no case, unless for some special adaptation to the purposes

for which the rooms are intended, should they be of unusual or extraordinary proportions as regards length, breadth, or height. The width of the courts of law should not in any case be less than 30 ft.

The court of the master of the rolls in Rolls-yard; the court of Exchequer at Westminster, the new courts at Manchester; the new courts at Brecon, and the crown courts at Cambridge; with the court in the privy council office, Downing-street, were noticed in the instructions as having been spoken of with approval. None of these courts have been sufficiently illustrated for reference for their full details; but the courts at Westminster by Sir J. Soane, are shown in BRITTON and PUGIN, *Public Buildings of London*, 8vo., London, 1825-28, ii, 257; and in SOANE, *New Law Courts*, etc., fol., London, 1828, p. 3, pl. 3, and pl. 8, 9 and 10: those at Manchester by W. Worthington, in *BUILDER Journal*, 1865, xxiii, p. 136; those at Brecon, in COMPANION TO THE ALMANACK, 1843, p. 253; those at Cambridge both by Wyatt and Brandon, p. 251, and the ALLGEMEINE BAUZEITUNG *Journal*, series ii, pl. 180; and the privy council office by Sir John Soane, in BRITTON and PUGIN, as above, ii, 236.

RICHARDSON, *Vitruvius Britannicus*, fol., London, 1802-8, gives i, pl. 35-7, the sessions house at Clerkenwell by T. Rogers; ii, pl. 1-4, the court house at York by John Carr; and 7-8 the court house at Stafford by J. Harvey. Defects in several existing law courts in England, are noticed in *BUILDER Journal*, 1846, iv, 445.

The *palais de justice* of France and Belgium is somewhat a kindred class of structure, examples thereof may be sought in GOURLIER, etc., *Choix d'édifices publics*, etc., fol., Paris, 1825-52.

LAWN. The name usually given to an extent of mown turf, along the garden-front of a house. This is produced in about two seasons by grass seeds sown on poor soil, or by turf brought from old pastures: it is preserved and much improved by mowing and rolling; and greatly injured by worms, rich spots of soil, or of manure. In the ancient style, it is varied by architectural forms, levels, and slopes; and in the modern, by groups of trees and shrubs so placed as to be connected in effect with the leading masses of foliage and to throw the grass into an agreeable shape or shapes. In very small villas it may not require the intervention of terrace scenery between it and the house; "and it may be separated from the park or parklike field by a light wire fence: but in more extensive scenes it should embrace a terrace or some avowedly artificial architectural basis to the mansion; and a sunk wall, as a distant separation, will be more dignified and permanent than any terrace", as observed by LONDON, *Encycl. of Gardening*, 8vo., London, 1850, §1565, who adds that "the park may come close up to the terrace garden, especially on a flat situation, or where the breadth of the terrace is considerable", as if he agreed, to some extent, with REPTON, *Sketches*, 4to., London, 1795, chap. v, who evidently meant unmown grass when he says (among some dozen passages on the treatment of lawns) that he calls "the wood and lawns, near every house, a park, whether fed by deer, by sheep, or heavy cattle", and that "cattle might be more frequently introduced than seems to be the custom of this country, especially sheep, than which nothing contributes more to enliven a lawn, and even to improve and fertilize its verdure." Such a lawn is generally called a *paddock*, and is separated from the mown grass of the pleasure ground, often only by a wire fence. Sometimes small groups of shrubs and flowers are placed upon a lawn. Where the edge is to be concealed, the *Ulex europæus*, common furze whin or Scotch furze, is preferable to the *Ulex nanus*, dwarf English furze; and linnets make their nests chiefly in furze, living on the seeds of the plantago, or (like most other singing-birds) on those of the polygonums, such as the bistort, buck-wheat, knot-grass, and persicaria. LONDON, *Treatise on Country Residences*, 4to., Lond., 1806, i, 316, describes the plants of which the lawn might consist beyond the mere grasses: and

which of them is agreeable, or is injurious, to animals. ONCE A WEEK *Journal*, 8vo., London, 1863, ix, p. 20-2. 14.

LAWRENCE (MASTER) with William Lemnyng or Walker, master masons, and Christopher Scunce, apprentice, were engaged 1505-15 upon the steeple of the church at Louth, in Lincolnshire; John Cole, employed from 1501-6, was probably "the master mason" to whom the above two masons went for "his counsel." *ARCHÆOLOGIA*, 4to., 1792, x, 72; 80-4.

LAY or LAYING. The first coat, commonly called "pricking up", laid over the laths in plasterer's work to receive the finishing coat or coats. It is made of lime and hair with a proper proportion of sand: in some old instances it was formed of clay and chopped straw. FIRST COAT.

In 1606 an item in a bill for work done included "In Lathing and Laying wth Lyme and haire all the Walls and Ceilings of the new nursery wth Laying wth Lyme and haire the bricke walls ther, as also in Lathing and Laying wth Lyme and haire the walk of a new plesant howse in the Springe garden £48:0:3;" British Museum, Addit. MS., 12,498, fol. 3.

LAYBACH or LAIBACH (the Latin *Æmona*). A town of the duchy of Carniola, in the province of Illyria, in Austria, situated on the river Laybach, here crossed by five bridges. The town consists of two parts; one grouped round the castle hill, with six or eight suburbs, all very indifferently built, with irregular, narrow, and ill-paved streets, and two rather spacious squares. The cathedral dedicated to S. Nicholas erected 1706; the church of the Virgin belonging to the Teutonic Order and constructed 1714 by D. Rossi; and twelve other churches, of which the best are the parish church of S. James 1597; the church (1714) belonging to the Ursuline nunnery, a very handsome structure; the church of S. Peter; and a protestant church built since 1848; the old Gothic landhaus; the rathhaus in an Italian style 1718; the old castle now converted into a state prison and house of correction; the bishop's palace; the theatre; the barracks; and the palace of count Auersberg, are most deserving of notice among the other buildings usual in a city. At a short distance to the north of the town there is a stone bridge over the Save, of eleven arches, 540 paces in length. 14. 50.

LAY-BROTHER. A pious, but usually an illiterate, person, who devoted himself in a monastery to the service of the religious. Another class of these brethren were the *oblats*, who devoted themselves to more menial servitude. There were also *fratres ad succurrendum*, assistant brothers, who wore only a short scapulary, while the professed lay-brother had the habit of the order. The institution of lay-brothers of the professed sort began in the eleventh century. The Jesuits termed their lay-brethren *coadjutores*; FOSBROKE, *British Monachism*, 8vo., London, 1817, p. 265-9. 14.

"The Laye Bretherns Statutes" at the monastery of Shene, (a manuscript in the British Museum, Add. MS., 11,303, fol. i), declares that "Wee have admitted laye men into our societie, because our purpose is to live by housbandrye and feedinge of cattle, rather than by rentes or revenewes to be received of other men, Who therefore must diligently looke unto husbandrye and nourishinge of beastes, and other corporall exercises, as it shall be enjoyed them", and then goes on to declare their duties, etc.

LAYENS (MATHIEU DE), master mason to the city of Louvain, erected the hôtel de ville (flamboyant style) at Louvain, commenced 29 March 1448, the exterior completed 1459, and the interior 1467; while employed on the work he received four sols (112d. or 39d.) per day in summer and three sols in winter; at its termination he received as recompense five peters and ten sols; *CIVIL ENGINEER Journal*, 1847, x, 29: he designed the church (third pointed style) of Ste. Waltrude or Waudru at Mons, of which he built the choir 9 March 1450 (-1502); designed 1450 the very fine hexagonal pyramidal tabernacle about 46 ft. high with brass doors, 1452-4 the

baptistry, and also the altar of the Virgin with a carved reredos in the church of S. Leonard at Léau; and completed the church of S. Sulpice at Diest after the death of his master S. van Vorst 1456, and erected the tower, c. 1490. He is said to have died about Christmas 1483; WEALE, *Guide to Belgium*, etc., 12mo., London, 1859, p. 468, gives his dates as "cir. 1420-94." The *ECHO DE LOUVAIN Journal*, 7 May 1848, contains a notice by E. van Even: it appears that G. Pauwels revised the design for the hôtel de ville at Louvain.

LAYER. A thickness of stone in a quarry less than about 6 ft. in depth, above which thickness it is called a "bed"; a much less thickness than a layer is termed a 'stratum'.

LAYER or LEAR BOARDS. These are explained in same dictionaries as the same thing; and (incorrectly) as used for sustaining the lead of gutters. LEAR BOARD; GUTTER BOARD.

LAYER (often written LAIR, which, strictly, is the den of any ferocious animal). The place where cows *lay* or rest at night, called in Scotland a BYRE. The word is used by farmers in contradistinction to "beast shed" or "ox-lodge", where those animals, and "stable", where horses, are kept. A cow layer should be well ventilated by openings in the walls and along the ridge of the roof, as these animals suffer much from a close atmosphere: in fact a shed open to the south, and carefully protected on the other sides, is often preferred to an enclosed building, at any rate in the south of England. A rough manger for hay is provided, and sometimes a "swinging bail", that is, a pole suspended horizontally by a chain from the roof and separating one animal from another. In good weather the cow layer is rarely used except for the purpose of milking. It should be properly paved, with a fall to a sufficient drain. In countries where there is plenty of chalk, a kind of paving is made of this material well rammed down. *BUILDER Journal*, viii, 29. ABATTOIR; COW HOUSE; CATTLE LAIR, MARKET, SHED; and FARM BUILDINGS. A. A.

LAY STALL (Gr. τόπος κομπίκός; Lat. *stercorarium*). A place where the manure, butcher's refuse, and other filth of cities and towns are collected previously to being removed by carts, barges, etc. It should be paved, with a good fall, and otherwise be well drained. As it has now become a custom to clear these places thoroughly every night, there is very little to be described as to their construction. They appear formerly to have been licensed. Elisha COLES, *Diet.*, sub voce, says, "*Paris garden*, the house of Robert de Paris, which king Richard 2nd (1377-99) proclaimed a receptacle for butcher's garbage, the bear garden in Southwark." The great lay stall of the city of London was at Queenhythe. A. A.

The ground between Bunhill-fields cemetery and Old-street was a common lay stall till the year 1706, but the soil thereof being soon after removed, divers new streets were thereon erected; MAITLAND, *History of London*, fol., London, 1739, p. 776. There is still a wharf called the Lay stall in Wapping High-street, but it is little used now for this purpose.

LAZARETTO (It. *lazzaretto*). A place of detention for persons and goods, suspected of being contaminated with the plague or other disease that is deemed to be contagious, when they arrive at a frontier or at a port. In the East it is simply a fenced and guarded enclosure, within which the persons who are confined dwell under such shelter as they may have provided or can procure. In Europe it is understood that a lazaretto should consist of dwellings separated by courts and of warehouses with yards, placed in an airy situation. A plan of such arrangements on a small scale in Ægina is given as a model by LENOIR, *Les Léproseries*, in DALY, *Revue Générale*, 1842, p. 9; a larger one, constructed 1733 in the sea at Ancona by Vanvitelli, with the fault of having a common courtyard, is also illustrated by this author, who considers that the establishment of a pest-house 1588 at Marseilles was the precursor of those at Genoa, Malta, Messina, and Venice. But HOWARD, *Account of the principal Lazarettos in Europe*, 4to., Warring-

ton, 1789, shows that the Board of Health at Venice was instituted 1448 during a time of pestilence, that its lazaretto was the earliest, and that its rules were adopted in the other European establishments: he gives the plans executed at Marseilles, Genoa, Spezzia, Leghorn, Messina, Venice, and Trieste; with a plan designed by himself. LAZARETTO, *The necessity for building a lazaretto for regular quarantine*, 4to., London, 1768.

The general views upon the subject propounded by LENOIR embrace a special harbour for the vessels, which are to be moored in isolated divisions according to the amount of suspicion attached to their human and mercantile freights: sitting rooms, bedrooms, offices, and promenades equally isolated; with similar conveniences in each division for those passengers who prefer privacy: offices arranged for unremitting watchfulness: yards for the ventilating, and disinfecting processes to be applied to the goods: and a chapel so situated and designed that those who are under detention may, without any possible communication with each other, simultaneously avail themselves of the services of the officiating priest. For this last purpose, the chapel consists of little more than an altar covered with a baldachin large enough to shelter the priest and his assistants. The addition of a cemetery, as LENOIR has observed, ought to be indispensable; and the site should have the prevailing wind from the coast or town. Among the most recent erections of this nature are that in the sea at Marseilles (about 1830), and that about 1840 for the marine at Toulon, which is situated on a peninsula like those at Ancona (begun by G. Dosi and completed by Vanvitelli), Civita Vecchia, Leghorn, and Trieste. The lazaretto facing the sea at Alexandria is much praised and was formerly a palace, the harrem portion being used by the first class travellers.

Near the porta orientale, outside Milan, is a vast lazaretto, said to have been founded about 1461-1500 by Ludovico (il Moro) Sforza, which may therefore have been designed by his architect Bramante: the building is dated 1489-1507 by DURAND, *Parallèle*, fol., Paris, 1801, pl. 30, who gives a plan of it, shewing two hundred and sixty four cells, and four at the angles. It is elsewhere described as being a rectangular cloister of red brickwork 1,213 ft. 6 ins. long and 1,179 ft. wide, with two hundred and eighty cells opening from the arcade: the chapel in the centre is sometimes said to have been designed by Bramante, and sometimes by P. Pellegrini (born 1522, ob. 1592). Near San Michele, in the neighbourhood of Verona, is a lazaretto dated 1591, being a rectangular area 789 ft. by 360 ft., with cells opening on an arcade, with four division walls in the court, running at irregular angles to a central chapel, as illustrated in three plates by RONZANI and LUCIOLLI, *Le Fabbriche di M. San Michele*, fol., Venice, 1832, p. 33.

LAZAR HOUSE (Fr. *ladrerie*, *léproserie*, *malandrerie*, sometimes written *maladrerie*). An hospital for the reception of persons afflicted with leprosy. Such establishments in Europe are stated by LENOIR, *Les Léproseries* (in DALY, *Revue Générale*, 1842, iii, 7, to be at least as old as the eighth century, when hospitals for leprosy were established in Germany by S. Othmar, and in France by S. Nicholas: he adds that these houses were called *misellaria*, *lazaretti*, and *micelleries*, as well as *ladrerries* and *maladreries*, the lepers being known as *miselli*, *lazari* and *mezeaux*. The use of the lazar house is generally attributed to the introduction of the disease from the east by the pilgrims returning after the winter of 1099 from the first crusade until the beginning of the second crusade 1145: the disease was certainly dreaded when Louis VII was attended by two persons only in his visit 11 June 1147 to the lazar house near the abbey of S. Denis. The opinion of some authors that leprosy was a disease amongst the Celtic races in Western Europe is, however, duly considered in LABOURT, *Recherches sur l'origine des Ladreries*, etc., Paris, 1854. These establishments were so important in France in the twelfth century,

that LENOIR mentions the existence 1172 in some parts of Bretagne of the arrangements noticed in the eleventh canon of the Council held 1179 at the Lateran, which says, "constitutimus ut ubicunque tot simul sub communi vitâ fuerint congregati (leprosi) qui ecclesiam cum cimiterio sibi construere et proprio valeant gaudere presbytero sine contradictione aliquâ permittantur habere;" and that they were numerous in France (where they were generally dedicated to S. Lazarus) is evident from the will (1225) of Louis VIII, who bequeathed 10,000 livres to be divided equally among two thousand of them. Rather later (1234-59) MATTHEW PARIS, *Hist. Major*, edit. Wats, fol., London, 1640, estimated at nineteen thousand the number of lazar houses in France, Germany, England, Italy, Spain, Brabant, Switzerland, Hungary, Poland, and the Danish States.

These figures are increased to twenty-two thousand in TURNER and PARKER, *Some Account of Domestic Architecture*, 8vo., Oxford, 1859, iii, pt. i, p. 46, who add that these establishments "were of a religious character and were priories: since the mode of curing this disease was discovered, these hospitals have been devoted to other purposes, and the buildings have generally disappeared: at Beauvais they remain nearly perfect, and are very extensive, now used for farm buildings." On the same page is cited, as quite intact, a structure about half a mile eastward of Oxford, which is thus mentioned by TANNER, *Not. Mon.*, fol., Cambridge, 1787: "the little hospital at S. Bartholomew, as ancient as the reign of king Henry I, and probably founded by that prince when he built his palace at Beaumont. It consisted formerly of a master, who was a priest, two healthful brethren, six infirm or leprous brethren, and a clerk: it being of royal foundation, king Edward III gave it, A.D. 1328, to Oriel college, who were to maintain therein a chaplain and eight poor brothers." But the domestic buildings, still inhabited by bedesmen, date 1649; the chapel, which recently was quite perfect although unglazed and disused, was rebuilt in the fourteenth century, and is transitional Perpendicular in character: illustrations of this structure occur in *Guide to the Arch. Antiq. in the neighbourhood of Oxford*, 8vo., Oxford, 1842-46, and in CRANSTOWN, *Chapel*, etc., published by the Oxford Architectural Society, fol., Oxford, 1844. This establishment is frequently confounded with another, at Sturbridge about a mile eastward of Cambridge, founded before 1199, and suppressed with alienation of its possessions about 1545; the domestic buildings are gone, but its chapel of S. Mary Magdalen is an interesting example of Norman work about 1100-35: illustrations of it are given in RICKMAN and COTMAN, *Specimens of Architectural Remains*, fol., London, 1838.

The above date 1328 shows that the reasons given by TURNER and PARKER for the disappearance of such hospitals, is not satisfactory: the disease might vanish, but not necessarily the edifices: as it diminished during the fifteenth century in Italy, the lazar houses began to empty: about a century later the same condition occurred in France to such an extent that Francis I (1515-47) placed a great number at the disposal of his grand-almoner, and the remainder seem to have been suppressed by Louis XIV (1643-1715). It is curious that much the same reason for the want of examples occurs in BOATE, *Ireland's Natural History*, 8vo., London, 1652, who notices p. 184, that kingdom as "almost quite freed from another disease, one of the very worst and miserablist in the world, namely, the leprosie, which in former times used to be very common there, especially in the province of Munster; the which therefore was filled with hospitals, expressly built for to receive and keep the leprous persons:—and as few leprous persons are now found there, as in any other countrie in the world; so that the hospitals erected for their use, having stood empty a long time, at length are quite decayed, and come to nothing." The last instance recorded in Ireland of a leper in a hospital occurred 1775 at the leper hospital, still so called, at Waterford. This seems to have been dedicated to S. Stephen: but those formerly at Hospital, co.

Waterford, with a master styled the prior of Lismore, at Dungan, co. Waterford, and at Kilbixy, co. Westmeath, were dedicated to S. Bridget. The grant 1408 of the custody of the leper hospital of S. Mary Magdalen near Wexford, with the lands, rents, possessions, churches, tithes, etc., thereunto belonging to John Rochfort for life, who was to support the houses, buildings, etc., and to defray all other expenses at his own cost and charge, may serve as an early example of the manner in which such establishments expired. The constitution of Sherbourn House hospital, near Durham, founded about 1180 by bishop Hugo de Puteaco for sixty-five lepers, was altered 1434 so as to admit only two lepers if they could be found: upon which STREET, *On Lychoscopes*, in the *ECCLESIOLOGIST Journal*, 8vo., London, 1849, ix, 113, 187, 252, 348, remarks, "it seems, indeed, that in later days many persons affected with cutaneous diseases, not leprous, were nevertheless called so, or perhaps called themselves so, to obtain the advantage of the noble and rich foundations established for their benefit." This writer urges that the low side windows in question were intended for the administration of the eucharist to lepers and others afflicted with disease.

It appears that at Warwick the mediæval hospital of S. Michael at the lower end of Saltford-street, is mentioned by TANNER, as "founded by Roger earl of Warwick in the latter end of the reign of king Henry, or beginning of that of king Stephen, for a master or warden and several leprous brethren; this hospital is still kept up for eight poor women."

The maladrerie near Beauvais is described by VERDIER and CATTOIS, *Architecture Civile*, etc., 4to., Paris, 1852-7, ii, 145; and p. 107 the maladrerie du Tortoir, apparently built 1300-50, situated between Laon and La Fère (Aisne) in France: the illustrations of these last have been borrowed by VIOLET LE DUC, *Dict.*, s. v. Hôtel-Dieu, and are described as exhibiting a square fence wall with three separate buildings attached to it: one was the kitchen with a dormitory over it for the ecclesiastical portion of the establishment; another was the chapel having a four light window on each side of its two bays; and the rest was the hospital with two doorways close to each other, one being for the attendants, the other for the carriage of patients. There was a communication between these buildings by an alure protected by a machicolated parapet on the top of the fence wall, it led into the gallery of the hospital. Eight divisions of the ground floor show seven beds and a staircase; externally there is no appearance of window to this latter access to the gallery, but there is a window to each bed and another over it to the gallery. The head of each bed was against the east wall.

In Pesthouse-row, adjoining to the French hospital in Old-street, stood till the year 1737 the city pesthouse, which consisted of several tenements, and was erected as a lazaretto for the reception of distressed and miserable objects infected by the dreadful plague in 1665: MAITLAND, *History*, etc., fol., London, 1739, p. 776.

The Lock hospital near London is said to have derived its name from the 'loques' or locks of hair or lint applied to sores, which term is also said to have formerly signified a lazar house or hospital for lepers.

PETTIGREW, *On Leper Hospitals or Houses*, in *Journal of the British Archaeological Association*, 8vo., London, 1855, xi, 9-34, with a figure of the chapel of S. Bartholomew, at Chat-ham, Kent; and 95-117, giving a list of one hundred and thirty-three hospitals, chapels, or houses, in England. SMIRKE, *Extracts from Original Records relating to the burning of Lepers in the reign of Edward II*, in Jersey, in *ARCHÆOLOGICAL JOURNAL*, 8vo., London, 1865, xxii, 326-31. The "Lepers' Bath" at Bath, designed by J. Wood, is described in *BUILDER JOURNAL*, 1856, xiv, 233.

LAZONBY QUARRY, near Plumpton in Cumberland, supplies a sandstone of the new red sandstone formation, mostly used for flags and landings, from 3 to 8 ins. thick. A white stone from the same locality was used 1860 by R. Nicholson of

Halifax, at the new congregational chapel, Charlotte-street, Carlisle; *BUILDER Journal*, xviii, 301.

LAZULI, LAPIS. A mineral which furnishes the beautiful blue pigment termed ULTRAMARINE. It contains of silica 46 parts, lime 28, alumina 14.5, oxide of iron 3, sulphate of lime 6.5, and water 2. It is hard enough to scratch glass, but does not readily give fire with steel. It is found in pieces on the borders of lake Baikal in Siberia; in Persia, Bucharia, Grand Tartary, and China, and in the island of Hainan in the China Sea, whence it is brought to Canton. Lapis Lazuli is often traversed by white bands or spots; its blue colour is of different degrees of intensity; the finest should be uniform in colour, and of a fine bright azure inclining to purple. The effect is greatly heightened when it is mixed with disseminated pyrites of a fine golden yellow. It takes a pretty good polish; and is used chiefly for jewellery, for Florentine mosaic work, as at the Taj Mahal at Agra, and sometimes for small inlaid decoration such as flutes for columns, etc.

A vase of lazulite fifteen inches high in a single piece is mentioned by BRARD, *Mineralogie*, 8vo., Paris, 1821. In slabs, it is used for paneling in churches; and it is employed in profusion in the marble palace built by the empress Catherine for count Orloff at S. Petersburg; JACKSON, *Minerals*, etc., 8vo., London, 1849, p. 144.

LAZZARI (DONATO) usually called Bramante, is styled Donato or Dominio Bramante by PUNGILEONI, *Memorie*, 8vo., Rome, 1836, p. 10; and by others Bramante Asdrualdini, Lazzari Bramante, Bramante Durantino, Bramante Lazzari, and Bramante Urbinese.

By LOMAZZO, *Idea del Tempio*, 8vo., Bologna, (1600?) xiv, he is styled "Donato cognominato Bramante da Casteldurante;" but although VASARI states that Bramante was born at Castello Durante, his commentator DE PAGAVE, in notes to the edition 8vo., Siena, 1791, v, 157, says that he was born in July 1444 at Stretta, two miles from Castel Durante now called Urbina; PUNGILEONI seems to assert that his father resided at the Castello di Farneta. By CESARIANO, *Vitruvio*, fol., Como, 1521, p. 4a, he is called "mio preceptore Donato cognominato Bramante Urbinate", and p. 70 b, "mio preceptore Donato de Urbino cognominato Bramante"; by SERLIO, *Architettura*, fol., Ven., 1663, p. 115, he is denominated (about 1535-40) Bramante da Casteldurante nel ducato di Urbino; he is claimed as a native of Farnetino by BALDI, *Memorie*, etc., di Urbino, fol., Rome, 1724, and by LAZZARI, *Ricerche della patria di Lazzari Bramante*, fol., Fermo, 1701; while other writers contend for the claims of Monte S. Pietro, and of Monte Asdrualdo, or di Asdrubale: in favour of the latter, MAZZUCHELLI says that the architect's signature was "Bramante Asdrubaldino"; and the medal by A. (Foppa) Caradosso bears the legend "Bramantes Asdrualdinus."

Equal uncertainty exists as to his parentage; DE PAGAVE considers that he was the son of Severo Lazzari and Cecilia Lombardelli; but PUNGILEONI asserts that his parents were Angelo di Renzo of the castle of Farneta called Bramante, and Vittoria di Pascuccio di Monte Asdrualdo.

As to his education DE PAGAVE, asserts that Bramante studied architecture under Sciro Sciri at Castel Durante; but left that place after constructing a small circular chapel of the Madonna del Riscatto on the banks of the river Metauro, in the twentieth year of his age; and from that period until his arrival (1476) at Milan was engaged in erecting churches, public buildings and other edifices in the Romagna. VASARI states that a Bramantino made drawings of old buildings, and that those drawings were studied by Bramante: but from the comments on this statement, which appeared in the Florentine edition of VASARI, 12mo., 1846, xi, 277-282, Bramante seems to have been, at Milan, a pupil of Agostino di Bramantino, and master of Bartolommeo (Suardi) Bramantino.

ascribed, correctly or otherwise, to the exertions of Bramante during the period 1464-76. A circular baptistery, at Como: and a marble pulpit in the duomo of that city. The octagonal church of Sta. Maria Incoronata, at Lodi, which he is said to have commenced 1476. The churches of S. Domenico 1469-1513, and of S. Ambrogio, with the palazzo (Blandrate, afterwards) della città, or at least a portal and porticos to it, at Casale. And lastly, the church at Canobbio.

His name is next connected with the following ten works at Milan where he was badly remunerated under Ludovico (Sforza) il Moro, regent and duke 1476-99; CESARIANO, p. 70 b says "fu paziente filio di paupertate cum fusse del duca Ludovico Sfortia architecto."

1. A passage in VASARI s. v. Garofalo, which was supposed by MILIZIA to apply to a Bramantino, ascribes to one designer the church and the sacristy of S. Satiro; (the church as it exists was originally built 869 according to OKELY, *Christian Architecture*, 8vo., London, 1860, p. 40: the interior at least was altered about 1480); and that Bramante was the designer of the interior and of the sacristy appears from two notices in CESARIANO, p. 70 b, who especially mentions the sacristy as his work. 2. The chapel of the large lazaretto outside the Porta Orientale; this has been attributed to Pellegrini as well as to Bramante; the LAZARETTO itself, founded 1461 by Ludovico but erected 1489-1507, (shown in DURAND, *Parallèle*, fol., Paris, 1801, pl. 30, has been mentioned as designed by the latter, as noticed by LATUDA, *Descrizione di Milano*, 8vo., Milan, 1737-8, i, 213-7. 3. To him also is ascribed the tomb of Stefano Brivio, who died 1485, in the church of S. Eustorgio. 4. It seems that Bramante commenced 1491 the church of Sta. Maria presso di S. Celso, and began the façade: some writers assert, however, that the front was designed by Cristofano (Solari) il Gobbo, continued soon after 1565 by G. Alessi, but altered and completed 1572 by M. Bassi; they may only refer to the portico, or rather vestibule, which however was in existence 1520, but seems to have been destroyed when the church was reduced to a simple oratory; according to VASARI this portico was finished by Cristofano Solari after the death of its designer, whom he calls Angelo Siciliano, (apparently the Sicilian Angelo de Manius, mentioned 1559-66 at the duomo in the HANDBOOK); but DE PAGAVE insists that Angelo was the builder originally employed to execute Bramante's design. 5. The church of S. Ambrogio has never been rebuilt: yet VASARI loc. cit. speaking of a Bramantino says that it was "rifatto col suo disegno, con un portico di pietra da un de' lati, e con colonne a tronconi a uso d'alberi tagliati": but it is supposed that a lateral portico, with the adjoining monastery (afterwards a military hospital) with its splendid cloister (now destroyed) was built about 1495 by Bramante. 6. The centre of the ospedale maggiore was erected 1621 by F. Mangone and F. Richini, who planned the great central quadrangle and, altering the capitals, availed themselves of an external portico executed by Bramante, which is in the right wing. 7. If the church of S. Maurizio Maggiore (which dates 1497-1506) was designed by Bramante, it was not built by him, but by his pupil or assistant Dolcebuono. 8. The school for orphans, formerly the monastery of Maurini (1509) attached to the church of S. Pietro in Gessate, outside the Borgo di Porta Tosa, was perhaps also erected by Dolcebuono from his master's design. 9. The vestibule which precedes the church of S. Nazaro Maggiore, and serves as the sepulchral chapel of the Trivulzio family. This (if later than 1518) was probably executed before the last inscription 1573, but in neither case is the ascription of it to Bramante justified by the date. 10. The cupola, at least, of the Dominican church, 1464-93, of Sta. Maria delle Grazie may be his work. The *Raccolta delle Principali Chiese*, fol., Milan, 1823, attributes this building to Bramante in 1492; as well as the church of S. Satiro, giving interior views of them. MIGLIORI, *Raccolta delle Fabbriche*, etc., di Milano, 4to., Milan, 1820, gives pl. 5-6 the plan and section of the sacristy of S.

Satiro; pl. 17, a door in the church; pl. 18, the tomb of S. Brivio; and pl. 28, the portico to the church of S. Maria presso S. Celso.

As ducal engineer, Bramante designed a covered way to the castle at Milan; was employed on the fortifications at Ticino; altered 1492 the castle at Vigevano, afterwards a palace and more recently a barrack, adding "li novi edifici" (CESARIANO, p. 113 b); and was sent in June 1492 to report upon a new bridge at Domodossola: KUNSTBLATT, 1838, p. 14.

The name of Bramante is included in the published list of the artists employed on the duomo at Milan, but without the precise date; if he was so engaged the date would probably be after 27 June 1490, because he does not appear in the history of the disputes up to that time about the *liburio*; whereas his assistant Dolcebuono was one of the persons to whom an order was then given for the execution of that work. The Florentine edition of VASARI, 1846, vii, 129, however, states that his absence at Pavia is noticed in the books of the wardens.

He was invited 1488 to Pavia, with Dolcebuono as his assistant, by the cardinal Ascanio Sforza, bishop of Pavia, to rebuild the cathedral: DE PAGAVE saw a drawing by Bramante dated 1490 for this work; but the foundations only were laid, the cathedral being constructed on a different design by Cristoforo Rocchi, who has been termed his pupil. In the same city an inscription records that the Barnabite church of Sta. Maria di Canepanuova was designed by Bramante, and commenced 1492 for Giovanni Galeazzo Sforza, duke of Milan, who died 1494.

At Turin the cathedral (1498-1505) is said to have been originally designed by Bramante.

Bramante resided 1498 at Milan, according to CESARIANO, p. 91 b and 109 a. In the following year his patron was expelled; and Bramante, nearly aged fifty-six, settled at Rome a few weeks before 24 March 1499-1500, according to VASARI, whose date is well corroborated. He painted in fresco the armorial bearings of Alexander VI (1492-1503) with angels and other subjects (which no longer exist) in the church of S. Giovanni Laterano; and with the remuneration for these and other things, added to the savings which he brought from Lombardy, he supported himself, according to VASARI, during his study of the antiquities in Rome, at Tivoli, in the Campagna, and even at Naples. These studious habits appear to have attracted the attention of Oliviero Caraffa, bishop of Ostia and cardinal of Naples, who employed him (1494 according to the *HANDBOOK*, 1850, is too early by six years as above proved for Bramante's practice) to rebuild the cloister of the monastery of Sta. Maria della Pace with travertine stone ("at Trivento", in BLONDEL, *Cours*, 8vo., Paris, 1777, vi, 473) which was finished 1504 according to LETAROUILLY, pl. 63-6. He was appointed assistant-architect (*sottoarchitetto*) in the construction of the fountains for Alexander VI, erected in the Trastevere and in the piazza di S. Pietro, but afterwards removed.

He was consulted, with other architects, upon the proposed enlargement of the church of S. Jacopo degli Spagnuoli in the piazza Navona: and on the design for the church of Sta. Maria dell' Anima which was commenced by a German, but completed (according to the *HANDBOOK*), from the design of G. da Sangallo.

The collection of drawings by A. Picconi da Sangallo in the Reale Galleria at Florence contain four which relate to the palazzo della Cancelleria begun by cardinal Scarampi Mezzarota: viz., i, 27, No. 158; ii, 27, No. 69; iii, 59, No. 169; iv, 43, No. 100. Upon these, the Florentine edition 1848 of VASARI, x, 41, remarks that "le Guide di Roma guidarono, dalla maniera più minuta e secca di questa fabbrica, che essa non fosse de' Sangalli, come si legge nelle prime edizioni, ma del Bramante: ma questi disegni stanno in favore dell' antica tradizione da loro rifiutata." It certainly is extremely remarkable that VASARI by no means ascribes to Bramante this palazzo, called "della Cancelleria" since Clement VII (1523-34); he merely states that Raffaello Riario, cardinal of S. Giorgio, em-

ployed Bramante "con altri eccellenti architettori alla resolutione di gran parte del palazzo di S. Giorgio e della chiesa di S. Lorenzo in Damaso—vicino a Campo di Fiore—e di questa fabbrica fu executore un Antonio Montecavallo." It therefore appears that the façade of this palazzo di S. Giorgio, although illustrated by FERRERIO as "architettura del famosissimo Bramante da Urbino circa l'anno 1512", was formerly and perhaps justly assigned to the brothers (Giamberti) Sangallo; and that Bramante, who did not arrive at Rome until 1500, as above stated, could have directed only the interior of this palace (a view of the cortile is given in ROSSINI, *Monumenti di Roma*, fol., Rome, n. d., pl. 26), which is dated externally as rebuilt 1495, according to LETAROUILLY, pl. 79-90, who nevertheless assigns the exterior to Bramante, but notes that the palazzo is extremely weak in detail, is built with travertine stone, and was completed 1512: the garden fronts were restored 1831 by Valadier. In LETAROUILLY the doorway of the church, as executed by Vignola, is given pl. 83, and that of the palace, as completed 1589 by D. Fontana in pl. 80; later (pl. 351) the same author exhibits two doorways from what he supposes to be the original designs by Bramante for these portals, but he does not state on p. 715 where the material for that plate was obtained; the collection above named contains a drawing by Picconi for one of them.

It is certain, however, that Bramante designed about 1502-4 the palace in the Borgo Nuovo in a very similar style (except the portal which MILIZIA says was altered a few years before 1768, *i. e.* for the comte Giraud), for cardinal Adriano da Corneto. It was built with travertine stone very slowly, and was still unfinished when its owner being obliged to quit Rome, gave it 1517 to the king of England, who transferred it about 1535 to cardinal Campeggio: from him it passed through the Colonna family, pope Innocent X (1644-55), and the Apostolical Chamber, to comte Giraud 1760, and the duca Torlonia 1830. It is illustrated in LETAROUILLY, pl. 145-9, with a conjectural portal; but in FERRERIO, with the portal as it existed 1652 or later, and with the plan.

To the same period belongs his enlargement of the Cappella Maggiore in the church of Sta. Maria del Popolo, according to the Florentine edition 1846 of VASARI, but in that of Sta. Maria Maggiore as printed in other editions.

For Ferdinand IV and Isabella of Spain he designed, about 1502, and built with travertine stone, the circular chapel of the Doric order, in the first cloister of the Franciscan monastery of S. Pietro in Montorio. This is shown in a perspective view pl. 323 by LETAROUILLY, who p. 666 gives a restoration of the intended circular cloister of sixteen columns, founded upon the plan pl. 322 as preserved by SERLIO, p. 120, who also shows the elevation and section of the chapel, which may be compared with those in pl. 103-5 of LETAROUILLY, who notices that the present leaden roof was executed 1821-31. The columns are of grey granite with marble bases and capitals; the crowning ornament of the cupola is also of marble. The structure was restored 1605 and 1628; another restoration is commemorated in a medal dated 1804. ROSSINI, pl. 34, gives a perspective view of this temple; a large photographic view has lately (1867) been successfully taken.

The general design by Bramante, made about 1503-4, of a magnificent court formed by a corridor connecting the ground floor of the Belvedere erected for Innocent VIII (1484-92) with the first floor of the Vatican, is preserved in BONANNI, *Numismata* (Hist. Templi Vaticani), fol., Rome, 1696, pl. 85, 86; also in D'AGINCOURT. He levelled the higher third part, or the garden, in front of two existing pavilions of the Belvedere, and built between them the present great niche shown in SERLIO, p. 218-9, with two flights of semicircular steps which VASARI states were removed for the staircase executed "nella maggiore nicchia in mezzo Belvedere" about 1550 by M. A. BUONARROTI, as shown in the *Illustrations*, pl. 116, s. v. At the south end he formed a great semicircular staircase, as a sort of theatre,

whereon people might stand to view the festivals in the court: but, as the steps became dangerous, they were removed and the ground was made level. In the collection already mentioned, iii, 10, No. 23, is a drawing inscribed "capitello ionico per li pilastri quadri del tertio ordine di Belvedere bastardati"—"del tertio ordine del corridoio di Belvedere di peperigno terminato per me Antonio Sangallo per che Bramante lo lassò imperfetto": this completion therefore must be dated 1523-7, and can only refer to the eastern side of the cortile: MILIZIA says that the elevation was altered as to the proportions under Benedict XIII (1724-30); but indeed the work was originally so rapidly done, that about 150 ft. in length fell in the papacy of Clement VII (1523-34), and were rebuilt under Paul III (1534-50): this event is not mentioned by SERLIO in the description of his illustrations, p. 214-5. The foundations of the western corridor were laid in Bramante's life-time, and the work was continued under Pius IV (1566-72): but the effect of the whole design has been destroyed by two central masses across the court. At the east end of the Belvedere, but outside the court, Bramante executed the staircase *a cordoni* of four orders, which has been highly praised by SERLIO, p. 219, and by LETAROUILLY, p. 334; the design is given in D'AGINCOURT. His staircase in the south-east corner was finished by Giocondo (BONANNI, p. 228). The adjoining cortile di S. Damaso in the Vatican is considered by LETAROUILLY, p. 132, as a work by Bramante of the same period: in this opinion he follows SERLIO, describing his illustration, p. 216-7, who ought to have known the author of the works, which his master Peruzzi strengthened by an addition to the arches of the Doric order; but VASARI, giving a reason for the failure, distinctly assigns this work to Raffaello: it is probable that the pupil added the fourth story showing an open loggia, to his master's design, which was of an Ionic Order over a Doric Order and a basement on the western side; and this is the only portion of the palace which answers to the description of such a work by Bramante mentioned in BONANNI.

The *testata* (ceiling?) of the hall for antique statues, with the range of niches, at the Belvedere was by Bramante; and, when his exertions were rewarded with the appointment of Striker of the Lead Seal (*bolle*), he erected for the business of this office a building, with a handsome "*vite*" or winding staircase. When it had been determined to concentrate the courts of law and other public offices, in the strada Giulia which Bramante had aligned, he was directed by Julius II to commence the palazzo di S. Biagio; but it was left unfinished 1513 on the death of that pope; scarcely anything remained in 1759 either of its rusticated basement or of its church which he commenced of the Corinthian order; a portion of the design is preserved in D'AGINCOURT.

He executed two windows in the sala regia of the Vatican: and did not hesitate to prepare a design for the rearrangement and restoration of the papal palace. He found that his patron was not disinclined to rebuild S. Peter's on a scale more magnificent than that of the work left by B. Rossellino and L.B. Alberti; and accordingly made several designs for a new cathedral. One of these being selected in 1503, half of the old building was demolished; and the foundation stone was laid, 18 April 1506, of a cathedral in the form of a Greek cross with a dome, two campanili, and a portico of six columns. The cores of the walls to the apses, and of the four great arches with their piers, are all of the present building that now can be ascribed to Bramante; who retained the old altar and choir, putting a screen of peperino stone which was finished by Peruzzi, and removed by Bernini; FONTANA, *Il tempio Vaticano*, fol., Rome, 1694. The design for the cupola is preserved in SERLIO, pp. 117-9.

In the life of Sanzio, VASARI says that the painter caused a palazzo to be built for himself at Rome in the Borgo Nuovo, "il quale Bramante fece condurre di getto:" in the life of the architect the same author uses a similar phrase. This appears

to be the building that in the Will of Raffaello is called "la casa che fu già di Bramante;" words which only mean that it had belonged to the architect who had resided at the Belvedere, as appears in VASARI s. v. J. (Tatti) Sansavino. The HANDBOOK states that the painter died in a house (designed by Bramante and Peruzzi) which according to a letter by M. A. Michiel dated 1520 had been bought by Raffaello from Bramante for 8,000 ducats; that it was afterwards the palazzo Spinola; that it has been called the palazzo degli Eretici Ravveduti, or palazzo degli Convertiti, since its conversion in the middle of the seventeenth century by cardinal Girolamo Gastaldi into a college for converted heretics; and that it stands between the church of S. Giacomo Scossacavalli and the piazza of S. Peter's.

With regard to other buildings at Rome attributed to Bramante, LETAROUILLY illustrates a house inscribed with the date 1500 in the via del Governo Vecchio, pl. 13; the octagonal capella di S. Giovanni in Olio erected 1509 near the Porta Latina, pl. 25; the principal court (or at least the portico on the south of the side next to the piazza di Vinegia) and stables erected for cardinal Fazio Santorio to the palazzo which passed from him to Julius II (1503-13) della Rovere, and 1523-34 to the Aldobrandini, now called Doria-Panfilii in the via del Corso, the rest being the work of Bernini, pl. 58; and the palazzo Lante, begun 1513 in the piazza de' Caprettari for Giuliano de' Medici by his brother cardinal Giovanni afterwards Leo X, and designed (not by Peruzzi as stated p. 133, but) by Bramante, p. 346, pl. 153-6, but completed by J. Sansavino according to MELCHIORRI, *Guida*, Rome, p. 584. But LETAROUILLY is uncertain about the palazzo erected 1505 for Cardinal N. Fieschi (a branch of the counts of Lavagna) which afterwards belonged to the Savelli, and later to the (Buoncompagni) dukes of Sora, occupied (1831) as a barrack for infantry and restored 1845, pl. 195, (and in FERRERIO pl. 21), because the bad detail contradicts the tradition of Bramante's employment; this criticism neglects how much was trusted by him to others, as Vitoni and Leno. And he wishes to attribute to him (because near the façade of the before-mentioned church of Sta. Maria dell' Anima in which he sees Bramante's influence and Peruzzi's doorways, although this front is generally attributed to A. Giamberti, p. 210-1) the house of the notary Sander bearing the inscription 1506, pl. 324: and also the tomb of the Floridi, about 1508, near the left hand on entering, in the church of Sta. Maria sopra Minerva, in spite of its peculiar details, pl. 278-9. He decidedly repudiates, for works of the master, two small palazzi in the piazza della Pace, pl. 23: the casa Farnesina afterwards called the palazzo (Silvestri now) Linotte in the vicolo dell' Aquila near the Cancelleria, pl. 49; this he ascribes to B. Peruzzi about 1534, or else to A. Picconi rather than to Buonarroti: and the cloister and cistern of the monastery of S. Pietro in Vincoli, pl. 140-2, assigned to G. (Giamberti) and A. (Picconi) da Sangallo by LETAROUILLY, p. 321-5, but stated to have been Bramante's design in CONDIVI, *Vita di M. A. Buonarroti*, fol. Florence, 1717, p. 18. An elevation of the palazzo Corsini alla Longara is given by FERRERIO, pl. 35, who says, "questo palazzo fù principiato con disegno di Bramante;" the plan was altered by F. Fuga, 1735-40, as shown in LETAROUILLY, pl. 191-2, p. 407. The Zeccha Vecchia in Banchi, now the Banco di S. Spirito, which has been usually ascribed by the Guide books to Bramante, is authoritatively given to A. Picconi in the Florentine edition of VASARI, 1846, x, 9 and 42.

It was supposed by D'AGINCOURT, that FERRERIO, *Palazzi*, could be trusted for his print entitled "facciata del palazzo et habitatione di Rafaele Santio da Urbino su la via di Borgho novo fabricato con suo disegno l'anno MDXIII in circa eseguito da Bramante da Urbino." But this plate represents the palazzo Aquila, which was built 1513-20, and on which Bramante was not at all engaged; because as VASARI mentions in his life of

the respective artists, it was designed by Raffaello, and decorated externally by G. da Udine with ornaments in stucco.

The following works are grouped together because it may be inferred, either from the dates affixed or from the localities, that they were designed after Bramante had removed from Milan to Rome. If the grand staircase *à cordoni*, in the palazzo (maggiore or) pubblico at Bologna, was designed by him, it was probably a result of his attendance upon the pope when visiting 1504 that city after the expulsion of the Bentivoglio family. The handsome church of Sta. Maria del Monte, about one mile from Cesena near Forlì, is attributed to him. At Città di Castello the cathedral, begun to be rebuilt 1457 in a pointed style, and continued 1488 on the new design of Elia di Bartolomeo Lombardo, is said to have been remodelled during 1503-53, upon designs given by Bramante and Raffaello his pupil, and to have been finished 1529. The fortress at Civita Vecchia, commenced 1508-12 by Bramante, but not completed until 1534-50 by M. A. Buonarroti, has been called one of the finest monuments of military architecture. The design of the brick cathedral at Faenza, commenced 1473-4, with a dome, is attributed to Bramante. He is said to have restored 1456 (a date which, if correct, in itself quite refutes the statement) the cathedral at Foligno, adding the cupola with the façade erected 1513 toward the episcopal palace; and to have directed the cupola of the church of the nunnery of Sta. Anna, called "le Contesse." The decoration in marble of the (house of the Virgin) santa casa, in the church of Sta. Maria at Loreto, which had been completed so far as the architecture was concerned by Bramante, is described by VASARI in his life of A. (Contucci) dal Monte Sansavino who executed the sculpture; and who also continued the palace of the Canonicate, or palazzo apostolico, upon the design which had been begun 1510 by Bramante: but as it remained unfinished at the death 1529 of Contucci, it was continued between 1529 and 1534 by A. (Picconi) da Sangallo, and subsequently, up to 1536, by G. Boccacino: a drawing, v, 46, n. 101, in the collection already mentioned, is inscribed by Sangallo's hand "Sta. Maria del Loreto in la Marcha, cioè lo palazo inanzi alla chiesa, principiato per Bramante, giudato male per lo Sansavino, bisogni correggerla."

About 1511, Bramante designed the villa imperiale near the old palazzo on the side of monte S. Bartolo, near Pesaro; this, except the hanging gardens, was not finished in consequence of the death 1538 of the duke of Urbino: under Clement IX (1667-70) the open galleries round the palace were closed because the rain had spoil the ceilings of the upper stories; and it fell into decay in the last century, when used by the Jesuits who were expelled 1759 from Portugal.

At Piacenza Bramante designed the church of S. Sepolcro, and the church of Sta. Maria della Campagna; some portions of the latter have been rebuilt, and the previous proportions of the interior spoiled. There seems to be some doubt about his having designed for the cathedral at Spoleto the external porch, consisting of five arcades between two pulpits, in a Composite order having pedestals to engaged columns: *Illustrations*, 1848-9, pl. 9. He designed the church of the Madonna di Consolazione, near Todi, having the plan of a Greek cross, with a central dome and minor cupolas, as shown in D'AGINCOURT; of this church a sketch, vii, 122, N. 301, together with a note of a scale "per fare lo chonvento a Todi" by A. Picconi, exists in the collection already mentioned. The Dominican convent of the Madonna della Quercia near Viterbo is said to have been built from designs furnished by him.

The following works appear to have been ascribed erroneously to this architect. The palazzo municipale or della loggia at Brescia; it was designed 1489 by T. Formentone who commenced it 1492. The Porta Felice at Palermo; if designed by him, it was not begun till 1582 according to GALLO, *Elogio*, 4to., Palermo, 1830, p. 50, who says that it was finished 1636,

probably by G. P. Novelli. The interior of the church of the Benedictine monastery of S. Giovanni at Parma; it appears to have been designed and commenced 1510 by G. F. Zaccagna.

When G. da Sangallo at the close of the year 1507 left Rome, probably being completely superseded in the papal favour by Bramante, his nephew A. (Picconi) da Sangallo remained, and then became assistant to Bramante, whom a palsied frame prevented from working any longer with his own hands; the master was so well pleased that 1512 he gave to the pupil the charge of the execution of the corridor from the Vatican to the castle of S. Angelo: in the later years of life Bramante was probably assisted by Raffaello. The construction of the works which the master designed in Rome seems to have been confided to Ventura Vitoni, who returned about 1508 to Pistoia; and to Giuliano Leno.

In the war of Mirandola (that town was taken 21 January 1511) the pope was accompanied in the field by Bramante and G. da Sangallo as military engineers: the latter returned to Rome, and received the appointment of architect to S. Peter's 1 January 1514 in consequence of the infirmities of Bramante, who died 12 (this date is sometimes given 11) March 1514, old style, and was carried to his grave in the crypt of S. Peter's by the papal court and the artists of the city.

This architect has been much praised, for his inventions, by VASARI, who mentions some of them in such a manner that there is great difficulty in comprehending his meaning. One of them is the employment of "ponti impiccati," or flying (*i.e.* unsupported from the ground) centres for arches. VASARI merely mentions "lo stacco." Another is the system of building by which Bramante "fece fare il palazzo che fu di Raffaello da Urbino, lavorato di mattoni e di getto con casse, le colonne e le bozze di opera dorica e rustica, cosa molto bella ed invenzione nuova del fare le cose gettate," which may mean brickwork and external plastering run with horsed templates; but more probably implies brickwork and external plastering with decoration, cast in moulds, to such an extent as to include the columns and the rustication. Connected with this is the method "buttare le volte di getto" or "gettare le volte": from the *Introduzione* (Architettura, cap. iv) which has been too much neglected because it occurs between the two proemiums of VASARI, it appears that the invention (called in Italy building *à cassetta*, as explained by BONANNI p. 68) consisted in forming the backs of the centres to the required shape and section by wooden molds to be filled in the proper places with cast ornaments, and depositing the plaster upon the molds as a bed for the brickwork; on removing the centres, the ceiling appears finished, and might authorise the expression "in one piece."

There does not seem to be any published account of the drawings by Bramante in the Biblioteca Ambrosiana at Milan; but a schedule of those in the Reale Galleria at Florence is given in the Florentine edition of VASARI, 1846, vii, 134, naming some sketches with dimensions of antique bases, capitals and cornices; a façade at Monte Magnanopoli; a plan, elevation, and section of a church; and an atrium for another. A plan of S. Peter's, drawn on a large piece of vellum, is also named in the list; and, as it is not therein identified with any hitherto published, it may be the design which could not be found at Bramante's death. This plan is accompanied by another of a palazzo di S. Biagio delle Pagnotte, which may refer to the intended palace in the strada Giulia; but it should be collated with the designs, iv, 49-59, in the same collection, marked by Bramante's assistant A. da Sangallo "per la casa mia di Santo Biagio ditto palazzo", and dated by him 1545, *i.e.* thirty years after his master's death. But commentators upon VASARI deny that, beyond being fellow countrymen, there was any relationship between Bramante and Raffaello (who have been styled uncle and nephew), which would account for the elder one's patronage. Yet VASARI was likely to have known the truth of the matter, when he wrote that besides the tie of country,

there was a slight family connection, "un poco di parentela", which caused Bramante to secure the papal favour for Raffaello before inviting him, at twenty-five years of age, to Rome. In that city the painter settled, in the summer of 1508, and executed two portraits of his friend. One of these is the stooping figure, marking the ground with a pair of compasses, in the School of Athens; the other is the bald and beardless figure, holding a book in the right hand and leaning on a wall, in the Miracle of Bolsena; another representation of him will be mentioned *s. v.* LENO. The bust in the protomoteca of the palazzo de' Conservatori was executed for Canova, by Alessandro d'Este. Besides exerting, fairly or unfairly to Buonarroti, his influence in favour of the younger artist, Bramante is supposed to have designed for him the buildings which appear in his earliest works at the Vatican: VASARI says "insegnò molte cose d'architettura"; and he finally complimented his pupil by a recommendation, as his successor at S. Peter's, recited by Leo X in the brief dated 1 August 1515 (printed in BONANNI, p. 70 at length), which confirmed to Raffaello that appointment, originally given 1 April 1514 according to FEA, *Notizie intorno Raffaello*, 8vo., Rome, 1822, pp. 8-15.

The majority of the edifices above named at Rome, the church near Todi, and a capital of the Composite order drawn from the antique, are given in SEROUX D'AGINCOURT, *Histoire de l'Art*, fol. Paris, 1823, pl. 56-8; and in LETAROUILLY, *Rome Moderne*, 3 vols., fol., with 4to. text, Paris, 1840.

It is very remarkable that GUENEBAULT, *Dict. Iconographique*, 8vo., Paris, 1845, *s. v.* Vatican, speaks of a work by MAZZERI dit LAZZARI, *Architettura della basilica di S. Pietro il Vaticano*, fol., Rome, 1684"; which probably is meant for COSTAGUTI, *Architettura della basilica di S. Pietro in Vaticano*, opera di B. Lazzari, etc., fol., Rome, 1684.

LAZZARI (GIACOMO) designed at Naples, the chapel of S. Filippo Neri; the great chapel, on the Gospel side, built with white and yellow marble; and the chapel of the Epiphany; all in the church belonging to the hieronymite Padri dell' Oratorio di S. Filippo Neri, called the Gelormini. 95.

LAZZARI (DIONISIO) the son of a Giacomo, a citizen of Rome, was a pupil of Dionisio di Bartolomeo. He designed at Naples, about 1620, the façade and cupola and high altar of the church built 1592-1619 by his master for the above-named Padri dell' Oratorio, and altered the dwellings and the two cloisters, all erected 1586-97 by his master, and the chapel of S. Francesco di Assisi. He also designed the portal for the great college of the Jesuits, finished by C. Fansaga. Amongst his other works were 1681 the church of S. Severo for the Padri Conventuali; 1682 the church of S. Giuseppe de' Ruffi; and 1684 the churches of Sta. Maria Egiziaca, and of Sta. Maria dell' Ajuto; but his most successful operation was the second restoration 1685 of the church of S. Giovanni Maggiore. He also designed the altar of the Ascension in the church of S. Gregorio Armenio, the marble pulpit in the church of Sta. Maria della Sanità, and some portion of the high altar in the church popularly called la Madre di Dio. 95.

LEA or LEE (SIR RICHARD), knight, also written à Lee, and a Leigh, was master of the ordnance in Scotland under Henry VIII, who granted him the greater part of the monastic buildings at S. Alban's, 1539 the priory of Sopwell in Hertfordshire, with other property. WALPOLE, *Anecdotes*, states he was a master mason and that "he chiefly excelled in Gothic", but offers no authority for this assertion nor reference to any works. CLUTTERBUCK, *Herts*, fol., London, 1815, i, 105, prints the pedigree, and p. 120, the epitaph in the churchyard of S. Peter at S. Alban's, neither giving any dates; CHADWY, *Herts*, fol., London, 1700, p. 461; and CAMDEN, *Britannia*, fol., London, 1722, i, 355; or 1789, i, 338. His signature is given in Addit. MS. 5752, fol. 345, in the British Museum.

LEACH (GEORGE) was appointed 14 March 1753 clerk of ARCH. PUB. SOC.

the works at Chelsea hospital, London, an office he retained until 1756.

LEACH (JOHN, afterwards Rt. Hon. Sir John), born 1760 at Bedford, was articled to Sir R. Taylor, whom he assisted in making the drawings for Stone-buildings, Lincoln's-inn, which are still preserved in the library of that inn. Having subsequently assisted S. P. Cockerell, he left the study of architecture for that of law, entering himself at the Middle Temple 26 January 1785, rising through each official grade to the post of master of the rolls. He died 14 September 1834 at Edinburgh where he was buried. GENTLEMAN'S MAGAZINE, 1834, new ser., ii, 647; CUNNINGHAM, *Handbook of London*, 8vo., London, 1850, p. 473.

LEAD. A term used by excavators, meaning any distance to which materials have to be removed.

LEAD (It. *piombo*; Span. *plomo*; Port. *chumbo*; Fr. *plomb*; Ger. *blei*; Dutch *loot*; Russ. *swinetz*). This metal forms an essential element in a large number of minerals, but the ores are far more numerous. The most important of these is the sulphide of lead or GALENA, which is the most common form of ore worked for the preparation of the pig lead of commerce. The process for the reduction of lead ores by double decomposition, comprises two principal operations; 1. The reduction of galena, by the aid of heat and atmospheric air, to a mixture of sulphide, oxide, and sulphate, which mutually decompose each other with the elimination of metallic lead. 2. The reduction of the oxysulphide by the addition of carbonaceous matter. This process is effected in the reverberatory furnace; the slag-hearth; and the Castilian furnace. After the ore has been taken from its bed, it is first picked in order to separate the unctuous and rich, or genuine ore, from the stony matrix and other impurities; the picked ore is then pounded by machinery under stampers, and being washed, is put into a reverberatory furnace to facilitate the evaporation of the sulphur. When the surface becomes somewhat pasty, it is covered with charcoal and well shaken together, the fire increased, till the purified metal flows into oblong moulds holding about 154 lbs. each, the contents of which are known as pigs: the scoræ are again melted and furnish a portion of less pure metal.

PHILLIPS, *Metallurgy of Lead*, read at the Society of Arts 27 April 1859, published separately, 8vo., London, 1859; the furnaces are described in BUILDER JOURNAL, 1859, xvii, 325; LANDRIN, *Du Plomb*, 12mo., Paris, 1857; RECORDS OF SCHOOL OF MINES, etc., pt. iii; Statistics of the Produce of Copper, Tin, Lead, and Silver, by R. Hunt, 8vo., London, 1853.

Lead is inferior in tenacity to other metals, for a leaden wire the 120th part of an inch in diameter can only carry 18.4 lbs. without breaking. It melts at a temperature between 612° and 633° Fahr., and boils and evaporates at a higher heat. Its specific gravity is from 11.300 to 11.479: a cubic foot should therefore weigh 711.8 lbs. on the average, but cast lead is said to weigh 717 lbs., milled lead 712 lbs., and wire lead 707 lbs. TEMPLETON, *Dict.*, states that a cubic inch weighs 4103 lbs. The tenacity of sheet lead is 3,300. lbs per square inch; the modulus of elasticity 720,000 lbs. A vertical rod of lead 348 ft. long suspended at one end would be rent asunder by its own weight (LESLEY); shewing that the ordinary tenacity of lead is but 1,719 lbs. to the square inch, or little more than half the tenacity of sheet lead, although some authors give it at 1,824 lbs. Lead wire or spun lead for horticultural purposes, at only $\frac{1}{16}$ th inch, exhibits considerable tenacity, and resists well atmospheric influences; it was manufactured by J. F. Poulet of Paris in 1851. The ARTIZAN JOURNAL, 1858, xvi, 201; and KIRBY and SPENCE, *Entomology*, 8vo., Lond., 1815, 1st edit., i, 231, record that lead is often riddled by an insect; and the French Academy has published in *Comptes Rendus*, several communications respecting such instances of the erosion of lead by insects; these are noticed in BUILDING NEWS JOURNAL, 1865, xii, 586-7. Cisterns are sometimes corroded and holes formed by pieces of mortar dropped into them, the lime of

which has tended to oxidise the metal and dissolve the oxide: and more than this, lead is acted on chemically by acids contained in some spring waters; a cistern at Acton was corroded through in a short time by such action; the water of Leith near Edinburgh is said to possess this quality; LEAD (effect of water on); ATMOSPHERIC INFLUENCE; GALVANIC ACTION.

Several pigs of lead of Roman manufacture have been deposited in the British Museum and elsewhere; several of them have the name of an emperor cast upon them; in two or three cases "Hadrian" occurs.

In the twelfth century lead was obtained from the rich mines of Cumberland, from Allendale in Northumberland, and from Swaledale in Yorkshire (TURNER, *Dom. Arch.*, 8vo., London, 1851, i, 9); the former supplied lead for Windsor castle, temp. Henry II, and for the great church of the abbey of Clervaux, in Champagne, and was frequently shipped to Caen.

In 1809-10 lead was bought at Boston fair for £3:4 per fother; 3 fothers cost 3s. 9d. for weighing, marking and customs; 18s. for carriage to Topsham; 17d. landing; and 3s. 5d. cartage to Exeter cathedral; OLIVER, *Exeter*, 8vo., Exeter, 1861, p. 380. BLACK, *On the price of lead in the reign of Henry VIII*, in *Journal of the British Archaeological Association*, 8vo., Lond., 1852, vii, 304-6, states that it cost £4:6:8: the fother (=19½ cwt.) at Leadenhall, or about ¾d per lb.; and about ⅓ part of the value of silver at that time—the *sow* of lead was the eighth part of the fother: the plumber's wages were 7d. per day. In 1606 lead was sent for to Danskein from Aberdeen, SPALDING CLUB, *Aberdeen Burgh Records*, 4to., 1844-48, ii, 285. In 1640, half a ton of lead cost 61s., NOTES AND QUERIES *Journal*, 3rd. ser., iii, p. 424. The names of the weights of ancient lead were, BING; CARRAT; FOTHER or Foder; FORMELLA.

The number of mines worked in 1861 in England, was 224 (chiefly in Cornwall, Devonshire, Cumberland, Durham, Northumberland, Derbyshire, Shropshire, and Yorkshire); in Wales 147 (chiefly in Cardiganshire, and Flintshire); in Scotland 7; in Ireland 7, and in the Isle of Man 5; total 390, producing 65,634 tons of metallic lead; BUILDER *Journal*, 1863, xxi, 36. The lead from the mines of Walter Beaumont, M.P., in Northumberland, when manufactured is known as "WB lead", and is considered of the best quality.

Sheet lead is of two sorts—*cast* and *milled*. In former times the lead was obtained in the *sow* or pig, and cast into sheets at or near the buildings in which it was to be used; in the present day it is often so prepared in the workshops of large ecclesiastical edifices (BREMEN). The thicker kind of *cast* lead is now manufactured by pouring it upon a long cast-iron table with rising edges along three sides of it called "sharps", (formerly it was of wood), from 16 to 20 ft. in length and about 6 ft. in width, which is covered with fine and damp sand beaten and smoothed down with a strike and smoother's plane. The pig lead is melted in a large vessel near the table, and is ladled into a pan of the shape of a concave triangular prism, whose length is equal to the width of a sheet; the pan is tilted over and the metal poured on to the table or mould. Between the surface of the sand and the *strike* (a piece of board about 5 ins. wide, a space is left which determines the thickness of the sheet: the *strike*, moved by hand along the sharps, bears away the superfluous metal before it has time to cool, into a trough, and this waste lead is then cut off for remelting. Some writers say the table should slope about 1 in. or 1½ ins. in 16 or 17 ft. The process in 1736 is carefully detailed in NEVE, *Dict.*

The thinner quality is cast upon a linen cloth stretched on an appropriate table over a woollen one; in this case the heat of the lead, before spreading it on the cloth, must be less than will fire paper, or the cloth would be burnt; and the *strike* must be passed over it with rapidity. Hence arose the mediæval expression *tela plumbi* (SURTEES SOCIETY, *Finchale Priory*, 8vo., Newcastle, 1837, 451). It is said the Chinese cast the

thin lead for tea boxes between two stones, much in the same way in which cakes or wafers are made in England.

Cast lead is preferred by plumbers for "bossing out" as it is softer and more malleable than milled lead, but it is liable to go into pin holes in consequence of the air bubbles rising from beneath the sheet in casting, and getting into the metal while liquid, often occasioning serious consequences. Lead for casting must be pure in quality; the sheets cannot be employed under 6 lbs. to the foot superficial: from 7 to 12 lbs. (by half pounds) were the thicknesses used circa 1735, when 9 or 10 lbs. (about ⅓ in. thick) was used for a platform or flat, and about ⅓ inch for hips and sloping works.

Milled lead. When first invented about 1670, the lead was passed through the mill twenty or thirty times before it was finished; each sheet was 3 ft. 6 ins. wide, and 34 ft. long, or twice as long as a sheet could be cast.

H(ALES) (T.), *The new invention of milled lead for sheathing ships*, etc., 12mo., London, 1691; B... (M.) *Observations sur le plomb laminé*, 8vo., Paris, 1731, which notices p. 21, that in the Statutes of the Master Plumbers of Paris, registered in Parliament 1 March 1660, article 36 expressly states that "d'employer du plomb passé par le moulin, tant à cause qu'il ne peut soutenir l'ardeur du soleil, qu'il se casse si fort, qu'il est impossible de le resoudre, que parce qu'il ne scauroit être netoyé ni gratté, à cause que la rouille le pénétre tellement au travers, que la soudure y est entièrement inutile."

For a long time a prejudice existed against *milled* lead. This appears to have arisen about 1700, when at Greenwich hospital, which was covered with milled lead, it was found in 4 or 5 years to have "rained in almost all over the hospital." Parliament sent the master and wardens of the Plumbers' Company to view it, and they unanimously declared that milled lead was not fit to be used. It appears to have been used as thin as 4 lb., and it was urged that the stretching by milling caused it to shrink and to crack when the sun acted upon it. Sir C. Wren is said to have sanctioned the use of 7 lb. milled lead as better than 9 lb. cast lead. It was used at Blenheim palace.

As late as 1824 the question was raised in the *MECHANICS' MAGAZINE* as to which of the two was more suited for gutters and flats. Even in a popular work of 1861 it is stated that milled lead is very thin, seldom more than 4 lbs. per foot super., and is not adapted to platforms exposed to the sun's rays or to great wear, being liable to expand and crack.

The process of milling sheet lead is now conducted as follows:—A cast iron pot is filled with about 8 tons of lead: the usual practice being to use about one third of old metal, (all solder having been first cut away), with two-thirds of good soft lead in pigs; a larger proportion of old lead being found to render the sheets too hard for use. The fire having been applied beneath the pot, the metal is not allowed to become too hot; and when ready it is let out near the bottom into a cast iron tray about 1 in. in thickness and 8 ft. square, into which four iron dogs have been let flush for lifting the plate of lead when cast. This plate, 4 ins. thick and containing about 5½ tons of metal, is allowed about an hour to set; the scum or dross having been first carefully removed with large wooden hoes. It is then hoisted by tackle attached to the dogs, and swung by a crane on to the rolling table, which is a massive wooden bench about 80 ft. long, 8 ft. wide, fixed at 3 ft. from the ground. A double row of wooden rollers, about 1 ft. apart, is placed along the whole length of the table to support the plate of lead as it travels to and fro, which it has to do a considerable number of times. The large driving roller worked by a steam engine of 40 horse power is fixed in the centre of the platform: a cast iron roller, about 18 ins. in diameter and turned to a smooth surface, is carefully hung parallel over it; and has an apparatus for being raised or lowered to vary the pressure. This upper roller is kept warm by steam, and is made ⅓ in. larger diameter in the centre to compensate for the flexure caused by the pressure when the lead passes under it. When the plate

has been rolled out to two-thirds of an inch in thickness, it is cut in half across its length, and the two plates are worked together, one upon the other, until they have extended to 40 ft. in length, being then about $\frac{3}{16}$ in. in thickness: they are next cut together into lengths suitable to roll out 36 ft. of 5 lb., 6 lb., or other usual weights per foot superficial; 10 ft. being allowed for 6 lb.; 8 ft. 6 in. for 5 lb.; and so on: the whole ingot takes about six hours for its conversion from the plate into the rolls. A length of 40 ft. and a width of 8 ft. can be made; but the rolls are usually sent out 34 ft. long by 7 ft. 8 ins. or 7 ft. 9 ins. wide. When the required thickness is obtained, the edges and ends are trimmed, and each sheet rolled up; the total weight, length, and weight per foot superficial, being first legibly stamped near the outside end. The milled lead of the best makers is fractionally within the standard weight: the thickness (in decimal parts of an inch) ranges according to the following scale; 8 lbs.=0.135, 7 lbs.=0.12, 6 lbs.=0.105, 5 lbs.=0.09.

Sheets as thin as 2 lbs. per foot superficial and even less are occasionally made, but as the dross, even to the smallest portion left in the casting, strips up while the sheets reduce in thickness, they require much care to mill. The dross is twice or thrice resmelted before the slag is thrown away; and as much as 60 per cent. of metal is obtained from this dross. In allowing for old lead, 4 lb. per cwt. tare is deducted: all soldered portions being first carefully cut out, and the rest is priced within 3s. per cwt. of the cost of new lead. The soldered parts are washed in a quantity of molten solder at a lower temperature than that at which lead melts, thus separating the solder from the lead portions.

J. J. T.

Every sheet of either stamped thus. The first line showing the total in cwt., qrs., and lbs.; the second line, the length of the sheet in ft.; and the third line, the weight per foot. The sheets should be tested for accuracy.

It is much to be regretted that some firms stamp their sheets which do not hold their weights, and call them "thick 5 lb.," or "thin 5 lb.," lead, as the case may be, meaning that the one is of fair thickness, and the other is not.

TABLE OF THICKNESSES OF LEAD

| Thickness, parts of an inch. | Weight per sq. ft. | Stated roughly, lbs. | Actual value, lbs. |
|------------------------------|---|----------------------|--------------------|
| .065 | 4.0 or rather more than $\frac{1}{2}$ in. | 4 | 3.708 |
| .085 | 5.0 " " " $\frac{3}{4}$ in. | 5 | |
| .10 | 6.899 " " " $\frac{1}{2}$ in. | 6 | |
| .11 | 6.189 " " " $\frac{1}{2}$ in. | 7 | |
| one ninth. | 6.554 | | |
| .12 | 7.078 nearly $\frac{1}{2}$ in. | 7 | 7.417 |
| one eighth. | 7.373 | | |
| .13 | 7.668 | | |
| .14 | 8.258 nearly $\frac{1}{2}$ in. | | |
| one seventh. | 8.427 | | |
| .15 | 8.948 between $\frac{1}{2}$ and $\frac{3}{4}$ in. | | |
| .16 | 9.438 | | |
| one sixth. | 9.831 | 10 | |
| .17 | 10.028 | | |
| .18 | 10.618 | | 11.125 |
| .19 | 11.207 | 12 | |
| one fifth. | 11.797 | | |
| .21 | 12.387 | 14 | 14.832 |
| | | 15 | 15.822 |
| | | 20 | 20.467 |
| | | 25 | 25.583 |
| | | 30 | 30.699 |
| | | 35 | 35.815 |

BUEN BUI DER Journal,
583.

Builder Journal,
xviii, 370, 401.

12 lbs.=9 ft. 4 ins. or about a square yard; *Price Books*, 1800 and 1819, when milled lead appears to have been used of the three first named weights, and cast lead of the latter ones.

LEAD (EFFECT OF WATER ON). This material has for some centuries been employed for containing any small collection of water for the supply of a house, as a cistern (a good example of one dated "15..." temp. Eliz. is given in *Builder Journal*, 1862, xx, 604), and even for the pipes conveying the water from its source to such reservoir. Of late years water in contact with this metal has been found to be more or less contaminated, especially when the water is of pure quality. In distilled water, which has been freed and kept from contact with the air, lead undergoes no change; but if the lead be exposed to air and water, it is oxidised and converted into a carbonate with considerable rapidity; this carbonate has the appearance of shining scales. The presence of saline matter in the water very much retards this oxidation. The more impure the water, the more it will form an incrustation (the insoluble salts of lead) on the metal lining, which hinders the subsequent supplies of water from coming in contact with the metal. A new lead cistern should be allowed to form this coating by the water standing in it for some time without being renewed. To expedite the action a little phosphate of soda, or iodide of potassium, or a few drops of sulphuric acid may be added. Water which has flowed over lead roofs, more particularly in towns, carries with it from the surface some soluble salts.

1.

To detect the amount of lead with which water may be impregnated it is recommended to add to a wine glass of water one drop of sulphide of ammonium, stirred with a glass rod or a quill, when a black precipitate, *i. e.*, sulphite of lead, will be thrown down. Bichromate of potash, as much as will stand on a fourpenny piece, put into a tumbler of suspected water and allowed to stand for twenty-four hours in a warm place, will change its colour from that of pale sherry and water to a more or less opalescent tint; and even form a slight film on the glass, according to the quantity of lead in the water.

Water standing in a lead pipe for some hours decomposes the metal, consequently when it is drawn off, such water should never be used for domestic purposes. The interior of lead pipes may be converted into an insoluble sulphide of lead by subjecting them for a few minutes to the action of a hot solution of sulphide of potassium, according to a recent discovery of Dr. Schwarz of Breslau.

Some persons consider the risk to health as much overrated—others state that, although the quantity may be practically equal to nothing, yet there is great difficulty in knowing how much is hurtful; water with as little as one-hundredth of a grain of oxide of lead per gallon has been said to produce lead paralysis. An inquiry into the question whether "lead poisons with hard water, or with soft, or with both", is discussed in the *Builder Journal*, 1852, x, 139-40: *Oshorn, Action of Water on Lead*, 8vo., Southampton, 1856, 2nd edit.; *Christison, in Edinburgh Philosophical Transactions*, xv, 271; quoted in *Brande, Manual of Chemistry*, 8vo., London, 1848, i, 849.

Two coatings of equal proportions of dry white lead and red lead, ground by hand with a stone and muller in turpentine, and then thinned up with gold size and turpentine to the consistency of ordinary paint, form a protective covering for lead, and will render an old cistern safe provided there are no cracks in it; *Builder Journal*, 1857, xv, 681.

LEADBETTER, Leadbeater, or Ledbeater (S . . .), designed cir. 1740 Foley-house, Portland-place, for Lord Foley, pulled down for the Regent-street improvements, cir. 1813-16 (C. H. Smith, in *Builder Journal*, 1863, xxi, 703): 1760 (9 May, first stone laid) the chapel of S. Paul, called also Portland, and Foley, chapel, in Great Portland street, Marylebone; it was completed 1766 at a cost of £5,000, but was not consecrated until 1831: May 1759-70 the Radcliffe infirmary at Oxford upon the plan of the county hospital at Gloucester:

One hundred weight of *sheet lead* will cover on a platform, roof, gutters, etc., at 4 lbs.=28 ft. sup., 5 lbs.=22 ft. 5 ins., 6 lbs.=18 ft. 8 ins., 7 lbs.=16 ft., 8 lbs.=14 ft., 9 lbs.=12 ft. 5 ins., 10 lbs.=11 ft. 3 ins., 11 lbs.=10 ft. 2 ins., and

Elvills (Tudor Gothic), Englefield-green, Middlesex, for Sir John Elvill, bart.; it was completed about 1766 (view in ACKERMANN, *Repository of Arts*, 8vo., London, 1827, ix, 126); and Nuneham Courtenay, or Newnham-park, Oxfordshire (the offices were built subsequently by L. Brown), for the right hon. earl Harcourt; NEALE, *Seats*, 1823, iii; WOOLFE and GANDON, *Vitruvius Britannicus*, fol., London, 1767-71, ii, pl. 99-100. The date of his death has not been ascertained.

LEAD COLOR. A pigment formed by a mixture of white lead with blue-black. The Addit. MS. 12,498 in the British Museum, notices 'lead color' being used in works at St. James's-park in 1605. **BLACK LEAD**; **PLUMBAGO** or graphite. **CHOCOLATE LEAD.** MINIOU or RED LEAD. **WHITE LEAD** or CERUSE.

LEAD NAILS. Nails used to fasten leather and canvas to wood: the sizes were 4½, 7, and 8, lbs. per thousand. They are the same form as clout nails, but are covered with lead or solder.

LEAD-HEADED NAILS are used in fastening lead hips and ridges to the angle rafter or ridge roll which they cover. In securing cheeks to dormers and other upright work, the nail heads are usually soldered down level with the sheet of lead.

Slates are sometimes fastened to iron roofs by lead nails, or more properly lead bands, instead of copper.

LEAD PENCIL, see **PENCIL.**

LEAD FOR GLASS WORK. A strip of lead called a *came* passed or turned through the glazier's *vice* (hence sometimes called 'turned lead') which causes it to receive a groove or *core* (Fr. *cœur*) on each side to hold the glass, and a rebate or *leaf* (Fr. *rainure*) on each side. The ornamental part of lead-light work is called *fretwork*. The leads used until the middle of the seventeenth century are nearly of one uniform width, and are much narrower in the *leaf* than the common modern leads. This fact is proved not only by examining the original leads themselves, but more satisfactorily perhaps by the black lines drawn upon the glass, with which the glass painters were accustomed sometimes to produce the effect of leads without unnecessarily cutting the glass. A, represents an ancient lead of the usual width; B, its section, consisting of the leaf *a* and *b*, and the core *c*. *c*, is the section of a German lead of the early part of the fourteenth century. *D*, is a piece of modern fret lead



of the ordinary width, which is now (1847) considered as being very narrow; and *E*, its section. Leads somewhat narrower than these were very extensively employed. An entire window at Stowting church, Kent, probably of the early part of the reign of Edward IV (1461-83) was leaded with the width shewn at *F*. The other lead *G*, from Mells church, Somersetshire, where similar lead is commonly used, is of the early part of the reign of Henry VI (1422-61).

This mode of strengthening the lead without increasing its width was not confined to the Decorated period. Both these specimens have quite the appearance of being cast in a mould. One of the faces in each is narrower than the others; these were placed outside, and the difference probably arose from the decomposition of the metal. A still narrower lead may be met with in heraldry and other minute mosaic work of the fifteenth and sixteenth centuries. It is hardly necessary to observe that the greater the number of leads employed the weaker individually they may be made. The width of the leads must be proportionate to that of the lines usually painted on the glass, for the leaden outlines will easily be detected if they are much stronger than the painted ones. The effect of the increased width of the modern leads *E*, although trifling, is very perceptible. The process of compressing the lead between rollers in a *vice* to the proper dimension makes them more rigid than the old leads. It is the practice at the present day to surround each glazing panel with a broad lead, that is, a

lead three-quarters of an inch broad in the leaf, to strengthen the work. WINSTON, *Inquiry into Style in Glass Painting*, 8vo., London, 1847, p. 27; 259-61.

LEADWORK, as lead glazing. One of the operations of the glazier; the other, or *fretwork* (Fr. *plomb de vitres*), being the ornamental portion of it. Leadwork is used in window openings which are filled in with glass set in lead comes, as often seen in ecclesiastical structures, whether for plain or painted windows; in inferior offices in country buildings; as well as in the buildings themselves, especially in those designed of a picturesque character. In iron frames these lights are fastened to cross-bars called *SADDLE BARS*, the lead work being riveted to the wider parts of the iron, and secured by bands soldered on to the lead lights and twisted round the smaller bars. Where openings to admit air are wanted, a casement is introduced of wood or iron. Sometimes a sliding frame is used, particularly for house windows. The squares of glass are usually called *quarries* and may be in lozenge or oblong form, varying from 6 ins. by 5 ins. to 7½ ins. by 5½ ins., or as may suit the opening of the light. The lead is in lengths of 4 ft. 6 ins. called *comes* or *calms*: when the quarries are 6 ins. by 5 ins. the lead should weigh 1 lb. of lead to 3 comes; if 7½ ins. by 5½ ins., 2 lbs. to 5 comes, increasing in weight according to the size of the squares. The glazing should be "cemented" both sides, and the joints, neatly turned on the outside, be fastened with copper or lead bands.

Leadwork is described in HOLMES, *Accidence of Armoury*, fol., Chester, 1688, p. 385, as divided into Quarry, Frett, Square, Prospective, and Diamond or Lozenge, work.

The employment of lead for building purposes and for decorative works is the detail of **PLUMBER'S WORK** or **PLUMBERY**. **PALEING.** **SOLDERING.**

Fretwork pateras are given in VIRLOYS, *Dict.*, 4to., Paris, 1771, pl. 68-9-10-1; GINDE, *A Book of Sundry Draughtes*, 8vo., 1615, partly reprinted with additions, by SHAW, 8vo., London, 1818: *Illustrations*, 1863-4-5, pt. 2, s.v. Lead quarry; and most of the publications on Stained and Painted Glass.

LEAF. A term applied by workmen and others to a variety of forms of materials. A 'leaf of timber' is the standard sized timber such as 12 by 7 by 3, 12 by 9 by 3, and 12 by 11 by 3, cut into 5, 6, 7, 8, 9, and 10 thicknesses, each being called a leaf, not being of any determinate thickness; GRANDY, *Timber Importers, etc., Guide*, 8vo., Lond., 1865, p. 83-6; 100. A 'leaf of gold' is the metal beaten out for gilding; DUTCH FOIL; GOLD. A leaf of a door, of a shutter, etc., is usually applied to one that folds. A headstone to a grave is sometimes called a leaf. The broad margin of a *came* or lead for glazing is called a 'leaf'; **LEAD FOR GLASS WORK.**

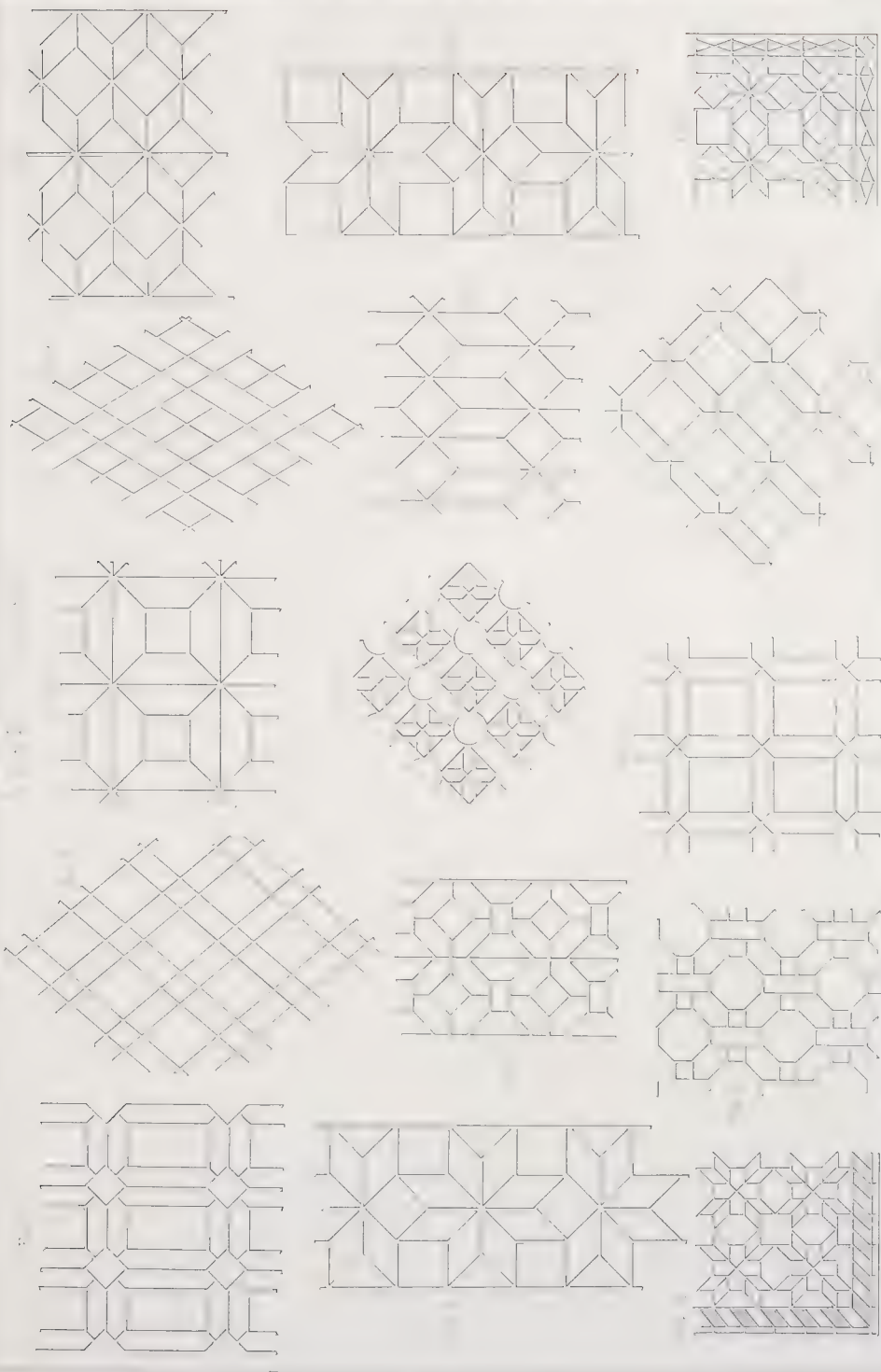
LEAFAGE. Much has been said about the choice of the leaves belonging to an indigenous flora for the decoration of buildings in various styles: the chief object of the present remarks is to give the opinions of authorities upon that subject, in addition to those already noticed in the articles **BOTANY** and **FOLIAGE**.

The *smilax aspera*, or clematis with thorns, was at once recognised by English botanists as the origin of the ornament peculiar to the vicinity of *Aperlæ* and *Antiphellus*, according to FELLOWS, *Asia Minor*, 8vo., London, 1853, p. 163.

The Greek use of the angelica, mentioned by VIOLETTE-LE-DUC, *Dict.*, v, 513, does not seem to have been noticed by any English writer.

A sort of pea's cod is mentioned by QUATREMÈRE DE QUINCY, *Dict. s. v. gousse*, as the type of an ornament which has been sometimes inserted in the Ionic capital.

The following remarks are supplementary to the observations and illustrations already printed s. v. **ACANTHUS**. It is stated in DALY, *Revue Générale*, 1842, iii, 77, that Guenepin obtained some credit for his discovery, by searching in the sheltered corners of the structure, that the leaf employed in the capitals of the Composite order to the arch of Titus at Rome was the olive,





and not the acanthus. The use of bold olive leaves by Bramante for the capitals of the Corinthian order at S. Peter's is mentioned by VASARI in his life of that architect. These facts may be explained by recourse to D'AVILER, *Cours*, 4to., Amsterdam, 1699, who perpetuated, p. 294-7, the confusion arising from describing the capitals of the Corinthian and Composite orders, as made with the leaves of the acanthus, olive, laurel, and parsley. His illustrations, however, assist his text in showing that these names were conventional terms for four varieties of the acanthus; as he makes the difference between them to consist in the open or separate condition of each subdivision or lobe of what he calls the acanthus, as opposed to the manner in which those of his laurel leaf and olive leaf cling together: and he describes the two latter as like the fingers when closed, the former as like the fingers when open; and his parsley leaf is nearly that of the acanthus, except that each lobe of the acanthus is subdivided into three, four, or five, lobes in the parsley. The *grande feuille* of his laurel leaf has *bouquets* or divisions of three or four *feuilles* or lobes, with wavy ends; whereas the lobes of his olive leaf terminate like a pointed arch, and are five, but in some cases only four, in number, of which last he cites the decoration in the capitals of the temple to Mars Ultor as an example. These *bouquets* are called "plumes" in the BUTLER'S DICT., 8vo., London, 1734, s. v. Capital. The appropriation of acanthus and olive to the Corinthian order, and of laurel and parsley to the Composite order, appears to have been general; although LE CLEK prefers for the former the acanthus and parsley; and CHAMBERS, *Treatise*, fol., London, 1791, speaking of the former order, says, "the capital is enriched with olive leaves, as are almost all the antiques at Rome, of this order; the acanthus being seldom employed, but in the Composite;" and speaking of the latter order, he notices "the different divisions of the acanthus leaf, and bunches of olive or parsley which compose the total of each leaf."

There is no very great difference, at first sight, between the olive in p. 295 and the palm in p. 299 of D'AVILER; who notices, p. 210, the use of the pomegranate on the columns of the altar of the church of the Val de Grace at Paris.

The distinction between the laurel, the myrtle, and the olive, marked by the shape of each leaf, has been too much disregarded.

Reference may be made to PIRANESI, *De Romanorum Magnificentia*, fol., Rome, 1761, for illustrations of the ancient employment of the ivy, pl. 18; laurel, pl. 8 and 11; oak, pl. 11; olive, pl. 8; and vine, pl. 14, 17 and 19. In studying that work with reference to the acanthus, it must be remembered that the picturesque appearance of mutilation was preferred by the artist, and that scarcely a single portion of the true original indentation of the leaf is given by him. For the probable pure outline of the Roman leaves reference may be made to TAYLOR and CRESY, *Arch. Antiq. of Rome*, fol., London, 1821; their book contains the first, and perhaps it is not too much to say the only, true representation of the peculiar leaf employed in the capitals of the temple to Vesta at Tivoli, which is stated by HUMPHREYS, *Rome, etc.*, 4to., London, 1840, p. 76, to have been copied from the local verbascom sinuatum, or mullein. Remarks upon the appearance of this leaf in France, and upon the Greek character of ornament in Italy and France, occur in LENOIR, *Histoire de la Sculpture d'Ornement*, in DALY, *Revue Générale*, 4to., Paris, 1841, ii, 225, 229.

For suggestions of resemblances between leaves in their natural state and in ornament, attention is directed to SIBTHORP, *Flora Græca*, fol., London, 1806, for the convolvulus, ii, 77; verbascom, iii, 2; solanum, iii, 29; cynanchum, iii, 45; silene, v, 11; papaver, v, 74; anemone, vi, 10; althæa, vii, 60; lupinus, vii, 77; ervum, viii, 2; centaurea, x, 2-10; aristolochia, x, 27; and arum, x, 38. And for the same purpose to HOGG, *Classical Plants of Sicily*, 8vo., London, 1834.

Whatever may have been as yet written on the subject of original types, they are barely recognisable in many cases, both in the classic and the mediæval periods of art.

ARCH. PUB. SOC.

An essay upon the subject should recognise the exceptional occurrence of the leaves of plants appropriated to the services of the several deities, or used as materials for the wreaths (commonly called crowns), by which the ancients typified victory; the conventional leaves, such as the water leaf with its boundary either plain or sinuous; the strap leaf (see PIRANESI, pl. 10, fig. A, which may be the true olive leaf); and that remarkable variety of the acanthus, called the Carlo-Maratti leaf: and attention must be given to the singularities of character attained by the leaves, that have been employed in the decoration of mediæval and modern Mahometan buildings in Spain, Egypt, and Persia. Careful observation should be given to the convex, flat, or concave, section of the leaf (or each of its lobes) in different examples all belonging to one style; and to the change of character assumed by a leaf in its transition from one phase of architectural style to another: thus illustrations of the leafage of the sacred plant of the Assyrians, and of the plant assumed to be the acanthus of the Greeks, might lead to a point, at which the two subjects would occur in one example, and diverge to such an extent as to terminate in the fleur-de-lis and the knobby character of the foliation in works belonging to the early English period of Pointed Art. Some remarks upon the Greek character of the ornament of the Norman and Early English Periods, occur in the *Report of the Proceedings of the Royal Institute of British Architects*, 10 January 1853, pp. 6 and 7. The thistle, olive, oak, parsley, and a few other plants, were much imitated in leafage by the sculptors at the *renaissance* in Italy; they were the only sculptors who did justice to the grace and vigor of the plants: the mediæval carvers made great use of the plants just as they emerged from the bud (which renders identification difficult), and gave a peculiar sparkle to their work by not only making all the protruding parts, points, or lines, catch the light, but enhancing the value of that light by the dark shadows produced by deep indentations. PALMETTE.

It appears that D'AVILER was aware of the difference between the acanthus mollis, which he says, p. 294, he saw cultivated for hedges at Algiers, and the acanthus spinosus, which he notices as smaller than the other, and as a type which Gothic sculptors had badly imitated.

Speaking of mediæval art, DALLAWAY, *Anecdotes*, 8vo., London, 1800, p. 19, says, "the foliage imitated on the finials and capitals is that of plants which are indigenous in Palestine, and not of the oak or vine as it is usually called. When compared with the euphorbia, the resemblance will be found exact." About ten varieties of the euphorbia, or spurge, are considered to be indigenous in England.

With regard to the sculptured vegetation of French art, RAMÉ, *Manuel de l'Histoire générale de l'Architecture*, 12mo., Paris, 1843, ii, 166, 333, 361, has previously made the following observations. The carvers in the twelfth century followed Roman and Levantine types. In the thirteenth century the four-leaved ornamentation was generally derived from the crucifera which are comprised in the Linnæan class tetradynamia; the five-leaved from the classes pentandria, decandria, and (including the apple, cherry, common medlar, and rose) icosandria; and the six-leaved (amongst which he includes the dianthus, or carnation and clove pink) from the class hexandria. He generalises for France the observations made by BOUSSERÉE, *Cathédrale de Cologne*, 4to., Munich, 1843, who, describing that building, p. 77, names these plants; la berce (ueracleum, Linn., hogweed or common cow parsley); le sabot (cyripedium calceolus, Linn., common ladies slipper); le chou crépu (brassica oleracea crispa v. selenisia, Linn., sea cabbage); l'ancolie (aquilegia, Linn., common columbine); and le glaieul (iris, Linn., flower-de-luce, or yellow water iris). Too much has been founded upon these remarks. The only other leaves which he particularizes are those of the bryony, cranes bill or storks bill, maple, strawberry, and trefoil. In the fifteenth century, according to RAMÉ, "la sculpture ne copie plus la noble végétation des

forêts; on n'imité plus la feuille de chêne et de hêtre; on ne prend plus pour modèle la feuille de vigne et le glaieul ou l'iris; le chou, le gros chou frisé, est employé presque exclusivement, et le chardon vulgaire, à feuilles pointues, reproduit la poulaine du quinzième siècle." (p. 369.)

Amongst his very energetic observations on the subject of the sculptured vegetation of the middle ages, VIOLETTÉ LE DUC, *Diet. s. v. Flore*, p. 498, has made two deserving special consideration. One is, that while romanesque vegetation combined with the remains of classic sculpture the results of an attentive observation of natural plants, it also was influenced by the importation of Oriental materials during the tenth, eleventh, and twelfth centuries; and therefore that no one should be surprised to find upon capitals and string courses, of the two latter ages, some resemblance to plants which were not then known in Western Europe; and this author, p. 508, gives an illustration of the Indian or Chinese *dielytra* applied at Vézelay. The other observation is that when the mediæval lay artists began to introduce their own flora, it was by no means a botanical flora: if they did endeavour to produce the resemblance of several plants, there was no attempt to render an exact account of the organism of any of them: while they saw no harm in mixing species—in taking a leaf from one, a bud from another, a stem from a third, they paid a scrupulous attention to the principal characteristics of their models, and they created a flora of their own; "cette flore monumentale a ses lois, son développement, ses allures, c'est un art, pour tout dire en un mot, non point une imitation." It is therefore not astonishing that authorities should differ as to which of all plants served, or might have served, for a model in any particular instance; indeed it must be acknowledged that among Viollet le Duc's successful efforts to find such models for his favourite pieces of sculpture, he includes a declaration that one example (p. 496) exhibits a combination of the cuckoo-pint (*arum*, Fr. *gouet*) and the flower-de-luce (*iris*, Fr. *glaiéul*). This author, however, does not seem to consider that a satisfactory origin for the mediæval fleur-de-lis has been found even by WOILLEZ; *Iconographie des plantes aroides figurées au moyen âge en Picardie et considérées comme origine de la fleur-de-lis de France*, Amiens, 1848; for he himself says that there is no great distance between the flower of the iris and of the fleur-de-lis, and that the early form of the ends of the sceptres held by royal personages and by the Blessed Virgin is a flower of the arum or a fleur-de-lis.

The mediæval French carvers seem, in their leafage, to have abandoned the imitation of Roman and Byzantine work, about the beginning of the twelfth century; and then along the banks of the Loire and the Garonne, in Poitou and in Saintonge, to have commenced, subject to the limitation above noticed, the use of natural leaves, which has been noticed in works dated before 1150 by VIOLETTÉ LE DUC to include the cuckoo-pint (*arum*), *coronille*, fern, fleur-de-lis, plantain, and water-lily. He recognises between that date and 1200 the employment of the leaves of the birthwort, celandine, columbine, cow-slip, cranes-bill (*geranium*), crowfoot (*ranunculus*), currant, *cymbalaire*, dock, fern, plantain, sorrel, vine, violet, watercress, and wood avens, with the flowers of the broom, crocus, flax, flower-de-luce, lily of the valley, marigold, *muffier*, pea, rue, and wallflower, with portions from other plants belonging to the natural orders alismaceæ, colchidaceæ, cucurbitaceæ, euphorbiaceæ, iridaceæ, malvaceæ, orchidaceæ, papaveraceæ, polygalaceæ, and rosaceæ. He notices the leaves of the celandine, holly, ivy, mallow, maple, *muffier*, sweetbriar, vine, watercress, and wood avens, as treated conventionally in the early part of the thirteenth century in the Isle de France and adjacent provinces; to which he adds the bindweed, fig, parsley, pear, waterlily, and wild plum, with oak and other forest trees in the later part, these being treated more naturally. He observes that "en Champagne, l'imitation matérielle paraît plus tôt: elle incline rapidement vers la sécheresse et la manière: en

Bourgogne l'imitation se fait sentir dès que le gothique apparaît, mais—elle est toujours monumentale, bien qu'elle reproduise souvent les végétaux avec une scrupuleuse exactitude." It is worth notice that in the middle of the thirteenth century the Burgundian school would not use the leafage of the bryony, celandine, cinquefoil (*potentilla*), cranesbill, mallow, sweetbriar, trefoil, and several umbelliferous plants, but preferred the bindweed, birthwort, chrysanthemum, columbine, gooseberry, ivy, parsley, plantain, scabious, strawberry, vine, violet, and wood avens. He mentions the contortions given in the fourteenth century to the leaves of the chrysanthemum, cranesbill or geranium, heath shield fern (which appears to be the type of a very usual English crocket), black hellebore, ivy, mallow, maple, oak, sage, strawberry, and vine, including the *grenadine* and the passion flower; and in the realistic end of that century the passion flower, southernwood, thistle, and thorn. He does not mention among the leaves imitated in the fifteenth century the plants specially mentioned by RAMÉE as above, but he notices the preference given to some of the algæ. The *Handbook* to the Mediæval Court at Sydenham cites SAUBINET as giving a list of more than twenty different species of flowers, etc. (those most usually employed being the crow-foot, ivy, laurel, oak, and vine) employed in the decoration of the cathedral at Reims. With the *style de la renaissance* the acanthus was revived in France; the subsequent leafage in that country is noticed in s. v. FRENCH ARCHITECTURE, which may be taken as applicable to Europe generally.

Although OTTE, *Kunst-Archæologie*, 8vo., Leipzig, 1854, p. 117, observes that crockets "am meisten dem kohlblatte gleichen" for the most part resemble the leaves of the cabbage or colewort; yet he adds "und unter den namen des frauenschuhes bekannt sind": but p. 350 he says that *marienschuh* and *frauenschuh* are synonyms; and p. 347, he employs the latter word for the technical name of crockets as resembling the cypripedium calceolus, known as common lady's slipper in the northern woods of England, where it is of very rare occurrence. The leaves which he notices as having been used amongst others for models by the German masons are those of the groundsel, hazel, holly, hop, ivy, oak, and vine.

A German author has mentioned that the *heracleum* is sometimes confounded with the *barenklau*, or acanthus.

The occurrence of the viscum album, white mistletoe, said to be represented with two leaves and a berry at the foot-stalk, on the label and on the inner moulding of one of the two Berkeley recesses executed in the south choir aisle of the cathedral at Bristol in the abbacy 1306-32 of Edmund Knowle, is supposed to be unique, and due to the great abundance of the parasite in the orchards of Somersetshire and Gloucestershire.

The *Hand-book of English Ecclesiology* states that in the transitional (from Norman to early English) church of S. Mary, New Shoreham, in Sussex, there is an interior molding of mulberry leaves; and at S. Mary's church, Broadwater, a late Pointed brass ornamented with maple leaves: the latter may have been correctly identified.

The mediæval architects especially selected the palm, maple, ivy, vine, oak, strawberry, plantaginista, five-petaled wild rose, fleur-de-lis, trefoil, holly, wood avens (or herb bennet, *early English leaf*) hop, hazel, fern, with countless varieties according to GRIFFITH, *Architectural Botany*, 4to., London, 1852, p. 9, who adds that, "so great is the number and variety of plants which have been employed by the ancient architects that it is difficult to determine with certainty those that have been already chosen." Indeed even the chosen ones are not always recognizable in sculpture by unlearned and unprejudiced eyes; of this fact a good example occurs in VIOLETTÉ LE DUC, *Diet.*, v. 486-7.

No one seems to have inquired after the normal types of the leaves which have been employed in the mediæval architecture of Ireland and Scotland, or in the "imitation Gothic" of Italy and Spain; nevertheless this part of the subject is one not un-

likely to prove very interesting in its bearings upon the history of those periods.

The following works relate to other suggestions which have been made for adopting various plants as the bases of novel ornament: GRIFFITH, *Principles or Laws which govern the formation of Architectural Decorations*, etc., read at the Royal Institute of British Architects 19 March 1855: COLLING, *On Form, Light, and Shade, in Architectural Foliage*, in *BUILDER Journal*, 1855, xiii, 620, who repeats that the wood avens is the type of the foliage of the thirteenth century; *Natural and Architectural foliage*, read at the Royal Institute of British Architects, 8 February 1858; *Art Foliage*, in successive numbers of the *BUILDING NEWS Journal*, 1864; and published separately, 4to., London, 1866: RUPRICHT-ROBERT, *Flore ornementale*, 4to., Paris, 1866; and *Cours de Composition d'Ornement*, in DALY, *Revue Générale*, 1850, xi, pl. 19-22: MILIZIA, *Opere*, 8vo., Bologna, 1826-28; vi, p. 91, pl. 2: and some leaf buds, including the honeysuckle, as material for ornament, are illustrated in the *BUILDER Journal*, 1863, xxi, 512, 550.

LEAGUE, the ancient leuca, leuga, leuva, leweke, etc. The name of a measure of length, containing a greater or a less number of geometrical paces, according to the usages of different countries, which is used in the same sense as the English MILE. As the length of the ancient leuca is enveloped in confusion, the student is referred to the PENNY CYCLOPEDIA, s. v. league, for an attempt at an elucidation; which, however, is concluded by stating the "conviction that the length of the league or leuca was, in the time of the old law writers, very near, one way or the other, to two modern statute miles and nine-tenths of a mile; the old mile being to the modern statute mile in the proportion of 45 to 100" (but more probably 145 to 100 is meant, as in s. v. Mile, p. 213). The article quotes a manuscript supposed to be of the time of Edward IV, as stating "v fote make a pase, and ther go viii forelongs to a mile in Yngland, and ii ynglysch myle make a frenshe leweke." 13. 14.

LEAKAGE. A word used to describe the oozing of a fluid from a defective pipe; the dripping from a tap or a wooden trough, and other similar defects. These all arise from various causes, and are remedied by different expedients of the several trades, as each case may require. A lead cistern very often leaks from the decomposition of the lead, due to the oxide which comes in from the surfaces of the iron supply pipes. In this case solder is of little use, as in general more places than one are affected, sometimes by mere pinholes. As the removal of the cistern, etc., is not only expensive but inconvenient, a simple remedy is to line the entire bottom, and the sides as far up as the oxide is likely to be deposited, with white glazed tiles bedded in cement; the lead is thus protected from decomposition and the cistern is much more easily cleansed. The leakage of a tap is in some cases to be remedied by regrinding the plug. The leakage of wooden arris gutters, troughs, etc., when not too far decayed, is frequently remedied by coating them with pitch when quite dry, or sometimes by stopping with putty, and painting them. A. A.

To ascertain what amount, if any, of leakage takes place in gas-fittings, from the meter inwards: shut all the burner taps, note the quantity already indicated by the meter dials, and also the hour: then turn on the main tap, examine the apparatus in a specified time, and the increase, if any, registered by the dials will be the measure of the leakage. J. W.

To stop leaks in roofs, water butts, etc., a composition made of 4 lb. of resin, 1 pint of linseed oil, and 1 oz. of red lead, applied hot with a brush, is said to be effectual; *BUILDER Journal*, 1858, xvi, 530: which also 1861, xix, 744, notices from the AMERICAN GARDENERS' MONTHLY MAGAZINE a stopping for leaks in hot water pipes, viz., iron borings or filings mixed with vinegar, and placed on the crack; the pipes having been first dried and kept dry until the composition is perfectly firm. Should a hole occur in a pipe, a piece of iron securely fastened

over it and bedded on with such a paste, will afford a protection for a length of time. IRON CEMENT.

Slate cisterns occasionally prove defective at the joints; they should be allowed to dry, and the cracks are then best stopped with white and red lead mixed together, painted over afterwards, and left to get dry before water is admitted. When slate is exposed to the weather, no stopping is good for much on account of the expansion and contraction of the slate. Cement will not suffice, as it will not permanently adhere to slate; consequently filleting to roofs is more lasting when done with "gauged stuff" than with cement.

LEANING PLACE. The thin vertical strip of wall between the sill of a window and the splay or floor. "It'm, made new in the quene's dynying chambre (in the Tower of London) a great carrall wyndow stoundyng on the west syde, and lenyng places made new to the same"; in Survey, 23rd Henry VIII, cited in Appendix to BAYLEY, *History of the Tower*, 4to., London, 1824-25, pt. 1, p. xix. 16. 19.

LEANING TOWER (Fr. *tour penchée*). The name given to certain structures now standing out of the perpendicular. The most celebrated examples are those at BOLOGNA, and the one at PISA. Others exist, as at FERRARA, to the church of S. Benedetto, 124 ft. high, built 1621-36; at ZARAGOZA, the torre nueva, built 1504; at Este, in North Italy, of high Romanesque antiquity, said to incline as much as that at Pisa; (CAMPANILE); at the palazzo del podestà at PADUA; one of brick at Neviansk, in Siberia, a view of which is given in ATKINSON, *Siberia*, 8vo., London, 1858, p. 93; at LEEUWARDEN; at Caerphilly, South Wales, shown in KNIGHT, *Old England*, fol., Lond., 1845-46, p. 254, fig. 909; and at Langres in France.

Tall chimney shafts or stalks are often again made upright by cutting out a certain number of mortar joints with a saw, on the side opposite to which they lean. This treatment was applied 1830 to the columns of S. Sepulchre's church, London, by — Clark, at their base; GODWIN, *Churches of London*, 8vo., London, 1838-39, p. 7, s. v.

A 'leaning portico' was restored by a Roman architect, temp. Tiberius, (A.D. 14-37) as related by Dion Cassius; and Petronius Arbitr, *Encyclopædia Britannica*, 8th edit. 1856, s. v. Glass, p. 658.

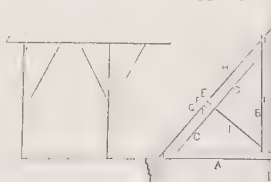
Fronts of buildings, which have sunk, have occasionally been restored to the perpendicular; as the north front of the tower of Jedburgh abbey, cir. 1800, by A. Elliot of London: the north front of the transept at BEVERLEY minster, four feet, by N. Hawksmoor, cir. 1739: the front of Croyland abbey, Lincolnshire, by G. G. Scott, cir. 1860; ASSOCIATED SOCIETIES, *Reports and Papers*, 1860, p. lxxvi; and 1861-62, p. 20-7.

LEAN-TO. The abbreviation of the term "lean-to shed" or "building," given to an erection whose roof consists of rafters pitching against, or leaning on to, another building or wall. Such a roof is called in Lancashire a "solpie roof."

LE MUET, *Manière de Bâtir*, fol., Paris, 1647, 2nd edit. 1663, p. 113, gives an example, which has been repeated in succeeding works, French and English; and in the translation by PRICKE, *Art of Fair Building*, fol., London, 1670, it is called a FENT-HOUSE roof, for the French "en appenty on a potence." A, the tie or

tirant; B, post or poinçon; C, principal rafter or force; I, strut or contrefèche; E, end of the wind-brace or panne; F, purlin or tasseau; G, block, bracket, cleat, or chantignolle; and H, common rafters or chevrons. The whole construction is a half truss or a demi-ferme. VIOLETT LE DUC, *Dict.*, calls it a "demi-ferme à pente simple," and the rafter C, arbalétrier. CULATIUM.

The lean-to roof is seldom used for other than small spans, but when of greater width a tiebeam, perhaps with a strut to



the purlin, is introduced. Examples for 11 ft. and 18 ft. are given in the *BUILDING NEWS Journal*, 1859, v, 41. Many aile roofs to churches also afford examples.

LEAR BOARD. The term usually applied in valley gutters to the first board, *r*, from the gutter board *e*, lying on the common rafters to receive the turned up lead of the gutter. It is also called the 'eaves board' and the 'tilting fillet' when at the foot of projecting rafters. The lear board is usually about 9 ins. wide and $\frac{3}{4}$ in. thick; it is not required when the slating is laid on boarding. **LAYER BOARD.**

Lear board is a term occasionally used for a barge or eaves board; and sometimes to a throated weather board or molding placed at the bottom of the outside of an entrance door to prevent water being blown under it.

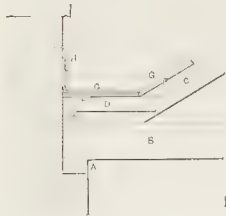
LEASE. The deed by which the owner of property assigns his interest to a tenant for a term of years in consideration of the payment of certain rents and the observance of some covenants. The law of landlord and tenant is very complicated, as may be expected from the number, variety, and importance of the interests concerned on both sides. In fact, the last epitome by WOODFALL, *Law of Landlord and Tenant*, 8vo., London, 1856, is a thick volume of 980 pages. When house property is the subject of a lease a surveyor, however, is often consulted. If called in by the solicitor to the lessor, or person granting the lease, he should first advise upon the value of the property, and the fair rent to be paid for the same. If it be of any size or importance, or circumstances should make such a course desirable, he should make a careful plan of the premises demised, and should "draw the parcels", that is describe in writing the boundaries of the same with their bearings, direction, and dimensions. He should also take an account of the state of repair of the property, and arrange what work should be done by each party. He should also consider whether any special covenants as to repairing and upholding the same in future are necessary, as well as the user of any special rights there may be, as of way, or of watercourse, and the avoidance of nuisance to the neighbouring property, and report the same to the solicitor for his guidance. If called in on the part of the lessee, or person who takes the premises, he should in like manner consider the rent, and state of repair of the place, and in particular whether the premises will stand during the term without extensive repair, and whether the construction of the roof, walls, drains, etc., appears to be judicious; he should also check the plan and the "parcels"; and may have to advise on the covenants as before stated.

If building land be the subject of the lease, the architect should advise with the solicitor as to the rents, and terms, as to the class of house to be erected; the lines of frontage; the direction, widths, and materials of the roads; the provision for sewage and house drainage; the general character of the houses, and the materials to be used; whether any shops or public houses are to be permitted and to what extent; whether any and what portions of the gardens or yards may be built on; and whether any other restrictions are to be placed on the use of the property, so that one part may not become a nuisance or injury to the others.

When farming land is the subject of a lease, the matters concerned are generally governed by local custom, and are the business of the land agent or steward, whose arrangements as to the buildings may require the assistance of the surveyor or architect.

A. A.

LEAT. A water-course or level for the conveyance of water.



LEBAS (LOUIS HIPPOLYTE), was born 1782 at Paris, where he studied under Vaudoyer, and subsequently under Percier and Fontaine. He gained 1797 a prize for a design for a pharos; 1800 for an école de navigation; and 1801 the first medal for a basilica or christian temple; all illustrated in DETOURNELLE, *Grand Prix*, fol., Paris, 1806, pl. 56; 85-6; 100-2: who also in *Architecture Nouvelle*, 4to., Paris, 1805, pl. 36, gives the design 1801 for a monument in the place Thionville, formerly Dauphine, to record the most noble actions of Desaix. It is said that he obtained at least fifteen other medals, besides the medallion of the prix départemental, the second grand prix 1806, and a gold medal 1808 and 1819.

He designed 1822 the monument to Malesherbes at the palais de justice; and projected another to Louis XVIII in the place du palais Bourbon. He supervised the works at the bourse, and also those of the chapelle expiatoire, in the rue d'Anjou; designed 1823-36 the church of Notre Dame de Lorette, which cost 1,800,000 francs and 400,000 francs more for works of art (GOURLIER, etc., *Choix d'édifices*, fol., Paris, 1837-44, i, pl. 115-7); and 1826-36 the maison des jeunes détenus and the maison de dépôt des condamnés, a model prison in the rue de la Roquette (GOURLIER, etc., iii, pl. 215-7); and also many public buildings in the provinces, the names of which do not appear to be recorded. His unexecuted designs include, 1810 an interior of a saloon for a museum of painting and sculpture in the style of the fifteenth century; a plan etc. for one of the four cemeteries near Paris; and a monumental fountain proposed for the place de la Bourse. With DEBBRET he published *Œuvres complètes de Jacques Barozzi de Vignole*, fol., Paris, 1816, 85 plates.

He was chosen 1825 a member of the Institut, for which body he 1831-2 constructed the salle des séances de l'Académie des sciences, at a cost of 120,000 francs (GOURLIER, etc., iii, pl. 201); and restored the salle of the academy of medicine. He was also professor of the history of architecture at, and president of, the école des beaux arts: member of the commission des beaux arts de la préfecture de la Seine; of the jury of the école royale d'architecture; and 1845 honorary member of the conseil des bâtiments civils until 1854; he was also hon. and cor. member of the Institute of British Architects. Lebas delivered funeral discourses on the deaths of M. de la Barre (LABARRE) 1833; M. le baron Gérard 1837; and of Percier 1838, all published by the Institut royal de France, (Académie royale des beaux arts). Among his pupils were A. F. J. Girard; F. C. Gau; and E. J. J. Grillon. He died 13 June 1867 at Paris.

110. 112. 114.

It was Jean Baptiste Apollinaire Lebas, engineer, who undertook the carriage of the monolithic obelisk from Luxor in Egypt, and directed its erection on the pedestal designed by J. I. Hittorff in the place de la Concorde at Paris; **LEBAS**, *Histoire de la translation*, etc., 4to., Paris, 1839.

LEBIDA or **LEBDA** (the ancient Leptis Magna). A ruined town situated on the Mediterranean, 65 miles east north east of Tripoli, in North Africa. It contains magnificent remains of columns, inscriptions, baths, an aqueduct, an amphitheatre, and a triumphal arch: the style is late Roman. The ruins were for the most part so deeply buried in sand that plans could not be obtained without very extensive excavations. Among those made 1816 by Capt. Smyth, the remains of the stadium are perhaps the most interesting; **BERCHEY**, *North Coast of Africa*, 4to., London, 1828, p. 50-78. Thirty-seven shafts and other architectural fragments were brought over and deposited in the British Museum.

50.

LE BLOND (J. B. A.), see **BLOND (J. B. A. LE)**.

LEBONS (JOHN) or **LOBONS**, was one of "y^e kinges iii M^r. Masons", as named about 1509 in an "estimate of y^e charge for y^e makinge of a tombe for king Henry 7", which was subsequently discarded. **NEALE** and **BRAYLEY**, *Westminster Abbey*, fol., London, 1818-23, i, 55 (at end); **BRITTON**, *Arch. Antiq.*, 4to., London, 1809, ii, 21.

LEBRUN (LOUIS), born 1770 at Douai, studied at the école polytechnique, and then applied himself to architecture, at Paris, where 1831 he was resident, if not practising. He published *Théorie de l'architecture Grecque et Romaine, déduite de l'analyse des monuments antiques*, 26 pl., fol., Paris, 1807; *Formation géométrique des quatre Ordres de l'architecture Grecque*, 4to., Paris, 1816; and *Mémoire sur l'église de Sainte Geneviève; et correction du plan, de la coupe, et de l'élévation, de ce monument*, 4to., Paris, 1817. This pamphlet and some others (named in QUÉRAD) published by him were directed against the tuition then given in the école royale d'architecture. INSTRUCTION. He also published *Précis universel sur la statistique des Voulés*, etc., 4to., Paris, 1828, 3 pl.; and died about 1840. 110. 112.

LECHNER (JOHANN BAPTIST), born 1758, practised at Munich, and greatly assisted Benjamin Thompson, count Rumford, cir. 1784-96, in the improvements of that capital, besides making about 1790 the plan for the "Rumford's hall" in the English garden or park, and also for its inn. He died in 1809. 68.

LECLÈRE (ACHILLE FRANÇOIS RENÉ), born (not 28 October 1786 as often stated, but) 29 October 1785, was the son of an architect who placed him under Durand, then professor of architecture at the école polytechnique. But, without asking permission, at sixteen years of age the son begged an entrance into the atelier of C. Percier and, once entered into the école d'architecture, gained there many medals. He was allowed 1806 to compete, obtaining 1807 the second grand prix, and (1808 at the unusually early age of twenty-two years) the premier grand prix for a design for public baths in a large capital. Accompanied by Mazois he arrived 12 December 1808 at Rome, where, after visiting 1810 Naples and 1811 Tuscany, he applied himself during the next two years to the task of a restoration: the subject 1813 was the Pantheon, and his drawings became the model for similar works by succeeding *pensionnaires de Rome*: tracings of a portion of this set connected with the construction of the portico, were presented by him to the Royal Institute of British Architects.

Passing through the southern provinces, he returned 7 March 1814 to Paris, where in the next year he opened an atelier: and also, during 1815-20 constructed or restored several country-houses, including the châteaux of Mouthuchet, Banteville, and Verneuil; built some private houses in Paris; and restored the hôtel of the comte Pourtalès. Amongst the remainder of his works may be enumerated 1820 the architectural portion of the monument to general Bonchamps at S. Florent; 1821 the restoration of the château of the comte de Chastellus; 1822 a chapel for the monastery of the Sacré-Cœur at Paris, another chapel in its garden, and the cloister; the construction of part of the château of M. d'Harcourt at Metz; and the restoration of the château of M. de Montesquieu at Villebois. He competed 1823 for the church of Notre Dame de Lorette, but the award was in favour of L. H. Lebas. The years 1824-5 were passed by him in laying out the quartier Poissonnière, in making plans for most of the houses in the *place Lafayette*, and constructing the building at the corner of that *place* and of the rue de Lafayette, with the dwellings of M. Abel de Pujol and M. Blondel numbered 18 and 20 in the rue Albouy S. Martin. The château of the comte de Nicolai at Montfort, built entirely with stone, belongs to the same period, and is considered one of his best works. The château de Mareuil; the large warehouses of MM. Boissaye and Francœur in the rue du Sentier, and many private houses, at Paris, fill up the list of his private business. NORMAND, *Paris Moderne*, 4to., Paris, 1837-49, illustrates the works in the *place Lafayette* 1825, i, pl. 21-3; the hôtel de Chastellus in the rue de Varennes 1828, i, pl. 77-9; the château at Montfort 1828, ii, pl. 72-5; an atelier in the rue d'Assas 1828, ii, pl. 154; and a house at Ellebonne 1835, ii, pl. 9-10. To these must be added the tomb of Casimir Périer (died 1832) in the cime-

tière de l'Est or du Père-Lachaise; and 1840 the pedestal for the statue of Guttenberg at Strasbourg by D. d'Angers (GOURLIER, etc., *Choix*, etc., fol., Paris, 1837-44, iii, pl. 320). The country-house for M. Villard, below Meudon, is given in KRAFFT, *Recueil d'Arch. Civile*, fol., Paris, 1812, p. 11.

His official career dates, 5 November 1818 as successor to Bonnard on the jury at the école d'architecture; 1831 member of the Institut; 1832 chevalier of the Legion of Honour; 1833 honorary member, 1840 titular member, and inspector-general, of the conseil des bâtiments civils; and 1847 secretary of the archives of the department of architecture at the Institut, where he signalized himself by arranging for reference the prize drawings. In later years he declined business, except for former clients and friends, confining himself to his official duties and his atelier. As an artist, he was one of the chief assistants to, and the successor of, Percier; as a professor, he encouraged independence of thought; for example, the list of his pupils contains the names of Abadie, Desbuisson, Jules Goury, Isabelle, Morey, and (last only in alphabetical order) Viollet le Duc. J. Goldicutt, an Englishman, also studied under him about 1814.

Dying at Paris 23 December 1853 he was buried in the cimetière du Nord, and eulogiums were pronounced by Raoul Rochette, Vinet, Visconti, and Isabelle. A medal was subsequently struck in his memory.

LANCE, *Notice*, 8vo., Paris, 1854, extracted from CALLIAT and LANCE, *Encyclopédie d'Architecture*, 4to., Paris, 1854, iv, p. 33; *Notice* by DONALDSON, in *Transactions of the Institute of British Architects*, 1853-54, p. 31.

LECLERC (CLÉMENT) was "architecte à Bourbon", in the sixteenth century; COMITÉ HISTORIQUE DES ARTS, *Bulletins*, 8vo., Paris, 1842-43, ii, 469.

LECOINTE (JEAN FRANÇOIS JOSEPH), born 21 July 1783 at Abbeville, was a pupil of Bélanger and of the special school of architecture at Paris. He gained 1810 the prix départemental, and then travelled in Italy and the Netherlands. He constructed and restored many hôtels and private houses in Paris and its vicinity; designed monuments in the cimetière du Père Lachaise; and directed the continuation 1818-25 of the stables (for the comte d'Artois afterwards Charles X) in the rue du faubourg du Roule, uniting to it the accommodation for the pages as well as numerous offices. In conjunction with J. I. Hittorff several other large works were executed by him; such as 1827-8 the construction of a new *salle (auditorium)* in six months, at a cost of 1,347,944 francs, to the théâtre de l'Ambigu Comique, Boulevard S. Martin (given in GOURLIER, etc., *Choix d'édifices*, etc., fol., Paris, 1837-44, i, pl. 141-4; the iron work in ECK, *Constructions en Poteries et fer*, etc., fol., Paris, 1836); the internal construction and 1825 the restoration of the *salle Favart* for Italian operas; besides designs for—the restoration of the church of S. Rémy at Reims, (given in the publication hereafter mentioned); a monument to the duc de Berri; a sepulchral chapel for the princesse de Courlande; the embellishment of the *place Louis XVI*, (now the *place de la Concorde*); a ball-room serving as a theatre for the baron de Braun at Vienne, etc. They also conjointly, as government architects, directed the decorations for many royal ceremonials such as occurred at the death of the prince de Condé, at that of the duc de Berri, at that of Louis XVIII; at the coronation of Charles X, etc.; and at the birth of the duc de Bordeaux, when he published with HITTORFF, *Description des Cérémonies et des Fêtes de — Duc de Bordeaux*, fol., Paris, 1827.

NORMAND, *Paris Moderne*, 4to., Liège, 1845, pl. 41-3, illustrates 1830 maison rue des Trois-Frères, N° 4; pl. 57-8, 1824, maison rue de Montaigne N° 12; pl. 94-7, 1834, maison à S. Germain-en-Laye; and pl. 139-42, 1835, maisons à l'angle de la rue Neuve-Vivienne et du boulevard Montmartre, N° 11, 13, and 15. In 1841 he designed with — Gilbert the cellular prison called La Nouvelle Force or Mazas, illustrated in CALLIAT

ET LANCE, *Encyclopédie d'Architecture*, 4to., Paris, 1852, ii, pl. 57, and iii, 87-9; 92-7. He became architecte du roi and chevalier of the Legion of Honour; and died 8 April 1858 at Versailles. 110. 112.

LECONTE (ÉTIENNE CHÉRUBIN), born 1766, was architect to Murat, king of Naples (1808-15), for whom he decorated the royal palace in that city; DUSSEUX, *Les Artistes Français*, 8vo., Paris, 1851, p. 299.

LECTERN, LETTERN, or reading desk (late Latin *aquila*; It. *leggio*; Sp. *facistol*; Fr. *aigle*, *lutrin*; Ger. *das pult im chöre*). The name of the desks from which the lessons were read. Those in the early Christian church have already been described; AMBO; ANALOGIUM; in the Ambrosian rites something resembling these is still retained. At Milan two splendid constructions resembling pulpits have been placed on each side of the choir, from whence the epistles and gospels are still read. In that part of the Roman Catholic church which adheres to the Gregorian ritual there is a light desk from which the epistle is read "in cornu epistolæ." This is then shifted to the opposite corner of the altar, and thence the gospel is read. In the middle ages fixed places for reading are found in several of the chapter-houses, as at Chester and Beverley; but these are constructions ascended by steps, and are in fact pulpits. The fixed lecterns of the mediæval period are very rare.

In later times in the Church of England what was called a reading-pew, or reading desk, has been in use for many years from whence to read the prayers and lessons, and was generally an unsightly construction. At present a desk with one or more decorated fronts, raised about a couple of steps, but fixed, is used, from whence to read as before stated, and is called a lectern. A desk on a sort of pillar with four sides sloping each way and turning on a pivot at the top of the stand is very common in the chapter-houses abroad, and is used from whence to chant the breviary services: it is probable that one now at Dettling church in Kent, figured in the *Glossary of Mediæval Architecture*, and in the *BUILDER Journal*, 1847, v, 326, is a specimen of them.

An ancient marble desk, discovered some years ago on the site of Evesham abbey, now serves, perhaps its original purpose, in the parish church: the shafts and base are new. The only other examples of this character are, one at Crowle near Worcester, restored by the late H. Eginton; and the upper or desk part of another at Wenlock priory; ASSOCIATED ARCHITECTURAL SOCIETIES, *Reports and Papers*, 8vo., Lincoln, 1865, p. 1.

The eagle, (as the lectern was called if it displayed the figure of that bird, as symbolical of S. John the evangelist and of his gospel), was constantly, though not invariably, employed to support the book-board or stone slab in the Italian pulpits of the Middle Ages. The pulpit in the chapel of the monastery of S. Benedetto at Subiaco (*Illustrations*, 1859, pt. 2); that of the basilica of S. Lorenzo at Rome, and that of the cathedral at Ravello, are all works of the twelfth and thirteenth centuries. The pulpit at Siena by N. Pisano 1226, (*Illustrations*, s. v. Pulpit, iv, pt. 3) and one in the church of S. Giovanni at Pistoia of rather later date, have the eagle in a similar position. In the example at Ravello, the pedestal on which the bird stands has the first words of S. John's Gospel, "In princip. erat Verbu", clearly showing the allusion. The pulpit in the baptistery at Pisa, is given SEROUX D'AGINCOURT, *Histoire* (Sculpture), pl. 32, N^o. 9. The pulpit at Milan has a large figure of an eagle and is so called. The *juuè* took the place of the *ambo* and *lectern* of the basilica. A. A.

As books became of a large size in the fifteenth century, a reading-desk or lettern became necessary; they were made of wood or metal; brass reading-desks of that century sometimes richly ornamented may frequently be met. Good examples occur in Douce's MSS. in the Bodleian Library at Oxford, 195, 202, 283, they are represented in TURNER and PARKER, *Dom. Arch.*, 8vo., London, 1859, iii, 141. The desks in

Giotto's chapel at Padua are given in *Illustrations*, s. v. Pulpit, iv, pt. 3.

ECCLESIOLOGICAL SOCIETY, *Instrumenta Ecclesiastica*, fol., Camb., 1847, contains many designs. GAILHABAUD, *Architecture du V^{me}*, etc., *siècle*, 4to., Paris, 1858, iv, gives examples with a good description of the lectern. The ECCLESIOLOGIST *Journal*, i, 173, notices many of the fine brass examples; and 1845, iv, 45, a sculptured fragment discovered in the ruins of Reading abbey, supposed to be a stone reading-desk, as it resembled the one at Crowle before mentioned: a fine example exists at Gloucester cathedral, but evidently it was not intended to read from it the gospel or epistle. WEBB, *Continental Ecclesiology*, 8vo., Lond., 1848, notices seven examples. 17. 19.

LECTORIUM, lectrinum, lectrinium, and lageolum. The ancient name for the place where the epistle was read, hence lectern and lettern for the desk itself. The epistle was anciently headed *lectio*, because it was read with a loud voice, without chanting.

LECTURE ROOM. The place in which a professor instructs his audience, which is accommodated with seats placed either on a level, or on a plane more or less inclined, according to the province of the lecturer; a gallery is also sometimes provided when a large number of seats has to be obtained. In hospitals and similar places it is requisite that the seats should rise very rapidly. A professor's room and an assistant's room are generally necessary adjuncts to the lecture room. T. ROGER SMITH, *Acoustics of Public Buildings*, 12mo., Lond., 1861, contains diagrams of some of the best rooms for this purpose. The "lecture hall" at Trinity college, Dublin, erected 1857, is described with its decorations in *BUILDER Journal*, xv, 412.

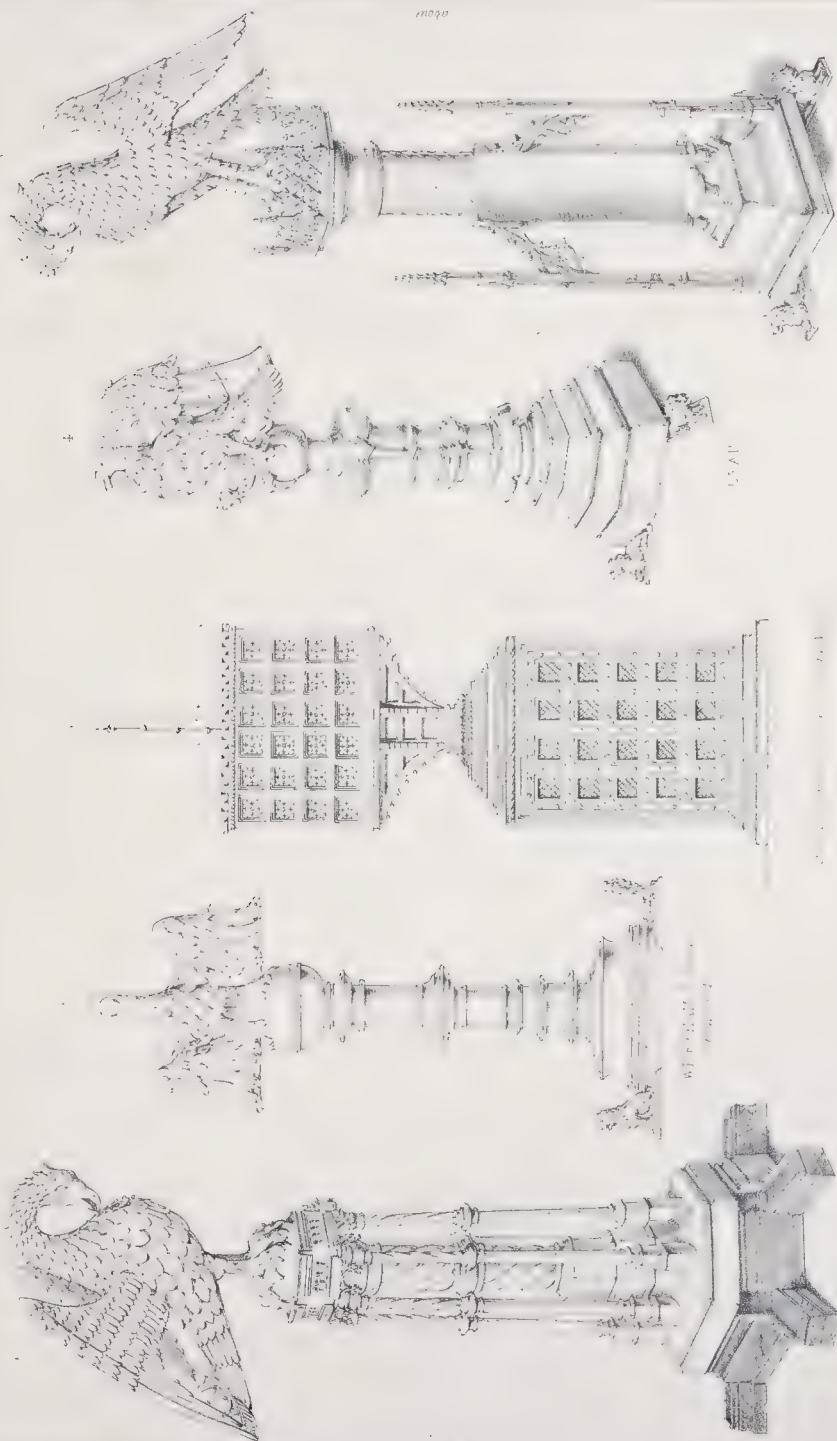
LÉCUYER or L'Ecuier (. . .), was elected 1715 member of the academy of architecture at Paris, and died 11 Feb. 1720. His son (?) also elected 1735 member of the same academy, was one of the fifteen academicians (twenty-eight *projets* were submitted) who presented designs 1748-53 for the *place Louis XV* (now de la Concorde, *PATTE, Monumens*, fol., Paris, 1787, p. 121); was appointed architecte du roi, and 1756 was the *contrôleur* charged with the department of the château and gardens of Versailles, of Trianon, and of the Ménagerie, Gallant being inspector under him; BLONDEL, *Architecture Française*, fol., Paris, 1752, iv, 95. He died in 1776. GABRIEL.

LEDGE. This word, whence LEDGER and LEDGEMENT are formed, seems to be derived from the Germ. *liegen* or the Dutch *leggen*, to lie or remain in a place. It has been used to signify a course of materials; thus WOTTON, *Elements of Architecture*, 4to., London, 1624, says that in foundations "the lowest ledge or row should be merely of stone, closely laid, without mortar; a general caution for all parts in building contiguous to board:" this case implies prominence, which is understood in speaking of ledges as supports to a shelf, of ledges as sides or "sharps" to a tray; and of a ledge as a piece of wood laid across others to keep them from shifting, as in a LEDGED DOOR. In metal work such a projection is sometimes called a *gib*. The rebate on the jambs and soffits of doors, and also the fillet nailed on to plain jambs against which the doors shut, have also been called a *ledge*, but the former is now termed a "rebated jamb", and the latter a "stop." CHECK; GINET; LEDGER. 1.

LEDGE sometimes occurs instead of ledger-pole: LEDGER. 13. LEDGE is applied to the 'bench' or 'berm' left on the face of a cutting. A steep cutting requires it for strength and support; it prevents earth from the upper part falling to the bottom; and at a change of slope occasioned by meeting with a different soil, it is requisite for a fresh start; BRES, *Gloss*.

LEDGED DOOR. A common door constructed of boards placed side by side, and kept in their places by another board called *ledger* (or *ledge*) nailed across them near the top and the bottom of the inner side. If not planed this door is called "rough ledged"; if planed "wrought ledged" or "prepared

LECTERN



Lithographed for the Society by F. Bedford August 22nd 1860



ledged", in this case the ledges are usually chamfered: in better sorts the boards are either "tongued" or "matched" together; and the door is much strengthened by diagonal braces from ledge to ledge: the best of all has the boards beaded, and is then designated a "ledged, braced, matched, and beaded door." Ledge doors have this advantage in outside work, that the wet runs down without check, and does not get into the mortices as is the case with framed doors. Ledge work is called 'sworded' in Lancashire. A. A.

LEDGED FENCE OR HOARD. Some speculative builders perceived, about 1835, that a large quantity of thin deals might be made useful while being seasoned: to this end, when the cellars and roadway were formed, the ground vacant for buildings was fenced with those deals placed upright between two ledges in a row near the top of them, and another pair in a row near the bottom; the ledges being spiked between deals to posts, the stuff received no damage. This system seems better adapted to the purposes of a fence, than that of placing the deals horizontally, and fastening their ends between pairs of quarters spiked together as posts.

LEDGED PARTITION. A partition dividing rooms, and constructed in every respect as has been described for ledged doors, except that it generally has scribed fillets on both sides against the ceilings, and scribed skirtings against the floors, and is very seldom braced, as it is not liable to rack.

LEDGEMENT. This term is described by GWILT, *Encyc.*, as "the development of a surface, or the surface of a body stretched out on a plane so that the dimensions of the different sides may be ascertained." The word is now almost obsolete: "development" being used by scientific men to describe the unfolded surface of a cone or similar figure; and "stretch-out" being applied by workmen to such development, as of a hand-rail, a soffit of a circular-headed window, a pendentive, etc. A. A.

A drawing is still sometimes called a ledgement if it exhibits the elevation of each side of a subject drawn up from a plan which occupies a central position in that drawing: such sides of a room having their floor-lines parallel to the corresponding sides of its plan; or the fronts of a building having their roof-lines parallel to the corresponding sides of the plan. G. A.

A piece of timber in a building is "in ledgement" when it rests upon an oblique bed, and not upon a horizontal plane; thus, a purlin in a roof is generally "in ledgement." R. R. R.

LEDGEMENT, or LIGEMENT, TABLE. A term in late mediæval architecture (it occurs in the agreement dated 1434 for building Fotheringhay church, Northamptonshire) for any of the upper courses of moldings between the windows and the "ground table stone." "It may fairly be taken in the more limited sense of a basement, the whole mass of which lies on the ground below the wall", says, WILLIS, *Nomenclature*, 4to., Cambridge, 1844, p. 27. "1024 feet of tweyne legement tables," is mentioned in the works at Eton college; MS. in Brit. Mus., as quoted in BRITTON, *Arch. Antig.*, 4to., Lond., 1809, ii, 89-90. 17. 19.

LEDGE OF A WINDOW, or WINDOW LEDGE. A name often given to a rounded window board, when the brickwork under the window is of the same thickness at the sill as the rest of the wall.

LEDGER, formerly written sometimes LEGER, LEIDGER, LEIGER, LIEGER, and LIGGER. This word seems to have formerly been the adjective of LEDGE; and to have signified that the substantive, which it qualified, was fixed or made to remain in one certain place: a ledger bait, a leger book, a leiger ambassador, are given as illustrations of this employment. In the builder's yard the terms *ledgerpole* and *ledgerstone* have lost their substantive, as appears by the two following terms.

LEDGER. A horizontal pole used in scaffolding, lashed to the upright poles or "standards" and supporting one end of the putlogs, the other end being carried by its insertion in a

hole left in the wall. A double clove hitch is first made round the standard, and then cross lashings round the ledger; these last in heavy work are tightened by long wedges. The term is equally applicable to a ledger-balk so used in framed scaffolding. The word *ligger* in scaffolding occurs in the records of Louth steeple; *ARCHÆOLOGIA*, 4to., London, 1792, x, 83. **LEDGE; PUTLOG; SCAFFOLD; STANDARD.**

LEDGER, or LIGGER. A large flat stone covering any open surface, as a brick grave; or forming the top of any table-like construction, as a tomb; or supplying a foundation, as a basement to a shrine or monument. The height of the tomb of Ralph Greene at Luffwick, in Northamptonshire, is covenanted to be "avec le leggement trois pees d'assise", *HALSTEAD, Genealogies*, fol., London, 1685, p. 188.

The custom of laying flat stones, on which are inscribed epitaphs containing the name, age, character, etc., of the deceased, over the graves of rich persons, has been transmitted to modern churches and cemeteries, from very ancient times, as appears from the writings of CICERO, *De Legibus*, xi, and others; Moresinus, *Papatus, seu, Depravatæ Religionis Origo et Incrementum*, 12mo., Edinburgh, 1594, p. 86, says, "lapidea mensa terra operitur humato corpore hominis quâ aliquo sit numero, quæ contineat laudem et nomen mortui incisum, mos retinetur."

LEDOUX (CLAUDE NICOLAS) was born 1736 at Dormans, in Marne. Abandoning engraving, he studied under J. F. Blondel, obtained the *grand prix* in architecture, and completed his studies at Rome. On his return he was appointed 1773 architect to Louis XV, member of the academy, and afterwards architect to Louis XVI. For the former monarch he made designs for a royal château to be erected at Luciennes near Paris, which was stopped by the death of the king in 1774; it is given in ii, pl. 199-201, of the work by Ledoux named below. His first work is said to have been the *pavillon* at Luciennes or Louveciennes, near S. Germain, designed and erected in three months for madame du Barry (pl. 202-5, and KRAFFT, *Recueil*, pl. 1 and 6), for whom he also designed the hôtel in the rue d'Artois, now Lafitte (pl. 112-6), and stabling at Versailles (pl. 117-8). At Paris he designed the hôtel d'Halwil or Halleville, rue Michel le Comte (pl. 100-2); 1767 the *porte* and hôtel d'Uzès, rue Montmartre, No. 176 (pl. 96-9, 146; NORMAND, *Paris Moderne*, 4to., Paris, 1837-49, i, pl. 25-6; KRAFFT, etc., *Maisons*, etc., fol., Paris, (1802?), pl. 75-6); 1772 the hôtel of the prince de Montmorency, at the corner of the rue du Mont Blanc, (pl. 103; KRAFFT, etc., pl. 40); the hôtel de Montesquieu; 1780 the hôtel de madame Thélusson, rue de Provence now rue Notre Dame de Lorette, opposite the rue Lafitte, subsequently occupied by Murat, and by the Russian ambassador, and now destroyed by the prolongation of the rue Lafitte (pl. 104-10; NORMAND, i, pl. 4; KRAFFT, etc., pl. 71-2; and KRAFFT, *Portes Cochères*, fol., frontispiece); 1770 the hôtel of mademoiselle Guimard, the dancer, rue du Mont Blanc ou Chaussée d'Antin, occupied 1802 by citizen Perregaux (pl. 119-20; KRAFFT, etc., pl. 49); 1782 the well known "barrières" at the chief entrances into the city, as du Trône or S. Antoine, de Charonne, d'Italie, de la Villette, and others (pl. 1-27, with designs 28-36), they were partially destroyed in 1791: five (blocks or) maisons Holstein or Hosten, Nos. 15; 8, 9, and 10; 11, 12, 13, and 14; 5; and 6, rue S. Georges and rue Ollivier (pl. 122-32; one of these houses is given in KRAFFT, etc., pl. 10, as built 1787 and afterwards inhabited by the ambassador of Baden and the Dutch consul); 1772 maison de Mme. S. Germain, rue S. Lazare (pl. 153-4; KRAFFT, etc., pl. 25); maisons de M. de Saiseval, rue de Bourbon (pl. 133-6); maison pour le comte d'Espinhal, rue des Petits-écuries du roi (pl. 149-50); maison de M. Tabary, rue Poissonnière (pl. 143-5); maison de M. le comte d'Atilly, rue Poissonnière (pl. 146-7); and a third maison (pl. 159 61): KRAFFT, etc., gives Ledoux's residence in the same street, 1780, pl. 20; and pl. 32 another, 1780, rue des Petites Ecuries, faubourg

Poissonnière; maison de M. d'Evry, rues S. Anne et du Ventadour (pl. 151-2); maison, rue Neuve de Berry (pl. 155-8); and the maison de M. de Mézières, at Aubonne, in the vale of Montmorency (KRAFFT, *Recueil*, pl. 8).

Ledoux also designed the theatre at Marseilles (pl. 71-7), and at Besançon (pl. 113-22); the *salines* at Arc in Franche-Comté; the château Benouville in Normandy (pl. 178-82); and the maison de M. de Lauzon at Chavigny in Poitou (pl. 216).

The other plates in the second volume comprise probably only designs; 1783 hôtel de ville at Neufchâtel (pl. 37-40); palais de justice and prisons for Aix in Provence (pl. 44-65); episcopal palace at Sisteron (pl. 66-8); chapelle succursale at Clichy (pl. 69-70); a library, before 1785, for Frédéric II landgrave of Hesse Cassel, who appointed Ledoux contrôleur et ordonnateur général de ses bâtiments (pl. 78-82); a building for a ferme générale, between the rues de Grenelle and du Bouloir (pl. 83-8); a caisse d'escompte (pl. 89-93); a storehouse for salt at Compiègne (pl. 94-5); maison de M. Witt (pl. 137-40); maison de M. le président Hocquart (pl. 141-3); maison de M. de Jarnac (pl. 148); maisons de commerce, etc., rue S. Denis (pl. 162-77); château de Maupertuis, and pheasantry (pl. 183-5); château d'Éguerie (pl. 187-90); château de S. Vrain (pl. 191-5); château du comte de Barail (pl. 196-8); a country-house (pl. 205-9); maison de M. de S. Lambert (pl. 210-1); maison de M. le chevalier de Mannery (pl. 212-3); maison de M. Schemitt (pl. 214-5); a country-house in the parc de Belle-vue (pl. 217); the *abreuvoir*, *lavoir*, and *école rurale*, at Meilliand (pl. 218-21); chapel and park entrance at Bourneville (pl. 222-6); and *bergerie* and *ferme purée* at la Roche-Bernard (pl. 227-30).

The arched roof formed of planks to a warehouse in the rue S. Lazare, is given in KRAFFT, *l'Art de la Charpente*, fol., Paris, 1805, pt. 2, p. 18, pl. 46. Some designs are given in LANNON, *Annales du Musée*, etc., 8vo., Paris, 1801-10.

According to a correspondence published in the *Journal de Wille*, 1787-89, quoted by DUSSEUX, *Artistes Français*, 8vo., Paris, 1856, p. 418, he made about two hundred and seventy-three designs by command of the grand duke of Russia. He published *L'Architecture considérée sous le rapport de l'Art, des Mœurs, et de la Législation*, 1768-89, fol., Paris, 1789-1804, 125 plates of designs, which was followed by vol. ii, 1846, with 230 plates of designs and executed works, with a memoir by D. Ramée. He died at Paris 19 November 1806.

LEPREUX (. . .), see DREUX (. . . LE).

LEE (THOMAS), was a pupil of H. Rhodes, and while in his office exhibited at the Royal Academy of Arts in London, 1774 a design for a ceiling in the Antique taste; and 1776 drawing of a summer-house in Lady Pelham's park at Esher, Surrey; with a design for a garden pavilion. He gained the silver medal of the academy for a drawing of the river front of Greenwich hospital. Having succeeded soon after he was of age to an independent fortune, he retired to Barnstaple in Devonshire, where he died 17 June 1836.

T. L. D.

His son THOMAS, born 1794 at Barnstaple, was educated at the grammar-school, then placed for a short time with Sir J. Soane, but was removed to the office of D. Laing at the period of the erection of the custom house. Having to attend his brother, Frederick Lee, R.A., who was laid up dangerously ill at Antwerp, he made a drawing of a view of the west front of the cathedral, subsequently engraved by Woolnoth and published by subscription. In 1814 he exhibited at the Royal Academy of Arts, a design for an entrance-hall; in 1816 he gained the silver medal for a drawing of the front of the duke of Devonshire's villa at Chiswick, outlines of which are in the library of the Royal Institute of British Architects; and in the same year he received the gold medal of the Society of Arts for a design for a British senate house, of which 1817 he exhibited at the Academy the perspective section of a chapel to the house of commons: he exhibited there 1820 a view of

a design for Pliny's villa at Laurentium, which he had prepared in a competition for the gold medal.

His first work of importance was 1817-8 the national pillar erected on Blackdown-hill, near Wellington, Somersetshire, to commemorate the victories of the duke of Wellington; it is triangular on plan, each face being 20 ft. wide at the base, 13 ft. at top, and 103 ft. high, with a circular staircase within it; the basement is 24 ft. 6 ins. high, and the pedestal which surmounts the shaft is 12 ft. 6 ins., making a total height of 140 ft. from the ground to the summit: the statue of the duke on the top, and trophies on the basement, were not executed on account of the want of funds. A bridge "lately erected" (1818) by W. A. Sandford, Esq. in the grounds at Ninehead-court, was shown in the drawing of the pillar exhibited in 1818. About the same time he designed the town-hall and market for Barnstaple; and 1821-2 a house at Arlington in North Devon for colonel Chichester. He carried out 1821 many important additions at the Ellows near Wolverhampton for J. Fereday, Esq.; and completed 1822 the mansion at Eggesford, Devonshire, for the Hon. Newton Fellows, in the Gothic style, which was faced with granite. About 1823 (the design was exhibited 1824) he erected the parish church of S. Clement at Worcester (Norman style). Later 1826-8 he completed a chapel of ease at Sedgley in the Gothic style, containing nearly 2,000 sittings at the cost of about £10,000; and built at Netherton, Dudley, a Gothic church to contain 1,500 sittings for £8,000. On the 5 September 1834, while bathing at Morthoe, in Devonshire, he was accidentally drowned, at the age of 40 years. Memoir by T. L. Donaldson, read at Institute of British Architects, 27 December 1838.

T. L. D.

LEEUWARDEN (Latin *Leoardia*; Frisian *Lieuwert*). The chief town of the province of Friesland, in Holland. It is surrounded by a deep broad moat with an exterior talus or rampart planted with trees; the sites of the walls have been formed into promenades. The town is well built, with broad straight streets intersected by numerous canals, the banks of which are planted with trees. There are said to be twelve churches of various denominations, the largest and handsomest of which contains several tombs of the princes of the house of Orange; that of count W. F. or W. L. of Nassau 1642 is by P. van KEYSER. The esteemed Oldenhoofer campanile or van Oldehoeve tower, situated just within the Harlingen gate, belonged to a church swept away in a storm; the tower was commenced 1529 in a pointed style by J. van AAKEN, and completed by C. Frederiksz van der Goude; it now leans very much. There is also a synagogue.

The other principal buildings are, the former court of the stadtholders of Friesland, now a royal palace; the *prinzen hof* or palace of the governor of the province, a large edifice designed by A. BRUINSMA; the old *landhaus* now used for the courts of first resort; the house of correction (*huis van burgerlyke en militaire verzekering*), an extensive building, the façade dated "MD," a rich specimen of brick and stone; the prisoners are arranged in four classes; the civil and military prison completed 1571, one of the richest examples of mixed brick and stonework to be found in Holland (described in *BUILDER Journal*, 1848, vi, 515); the large handsome town-house, *cir.* 1780, by J. O. HUSLY; the weigh house; the corn exchange; the new barracks; and the usual benevolent, educational, and literary institutions.

14. 28. 50.

LEFEVRE or LEFEVRE (. . .) is only recorded in the following publications, as having executed 1799 the atelier de la flature de la maison de force des femmes, rue S. Lazare, faubourg S. Denis, KRAFFT and RANSONNETTE, *Plans*, etc., *Maisons*, etc., à Paris, fol., Paris (1802) pl. 120; and 1800 l'école d'équitation de M. Amelot, rue de faubourg S. Honoré, pl. 119. KRAFFT, *Recueil d'Architecture Civile*, fol., Paris, 1812, pl. 40, gives the garden buildings designed for — Thierry at Ville d'Avray; and by Lefèvre jun. in pl. 70, the house of — Clément at Etampes; and KRAFFT, *Portes Cochères*, fol., Paris,

1838, pl. 23-4, gives an example of one on the boulevard de la Madeleine, corner of the rue des Capucins, as designed by him.

This is not the same person as Le FÈVRE of Orleans who lived before or about 1700.

LEG. An upright support to a table, bench, etc., which is often ornamented by turning or carving, and into which the horizontal rail is generally framed. The term is also applied to each end of a pair of compasses; the limbs of the stand of a theodolite or level; the pieces of timber forming a pair of sheers; and other similar supports; as also to piers of brickwork or concrete supporting a continuous wall, either forming a part of the original construction or subsequently put in as underpinning. The expression "standing on legs" is applied to a building when the whole or one half stands on small piers, stone columns, or iron stanchions, above the ground level.

LEGEAY (JEAN), wrongly called Le Gay, Legeai, Léger, and Lejai, a Frenchman, was invited 1754 to Berlin, where he held the rank of royal architect according to PATTÉ, *Monuments*, fol., Paris, 1767, p. 7, but it is uncertain whether he executed any works. It is said that the Roman Catholic church of S. Hedwig at Berlin was altogether or partly his work. This church was designed 1743 by Büding, who left Prussia 1766, and was built by Boumann, who finished it according to NICOLAI, *Beschreibung*, 8vo., Berlin, 1786; and it has been suggested that Büding left the dome to the care of Legeay. NICOLAI, *Appendix*, 141, says that he executed very little, but may have made the plans for the *grands communs* to the new palace near Potsdam; and the same author, p. 1231, says that this building was altered after Gontard's appointment. NAGLER seems to make a distinction between his embodying the ideas of the king for the new or second palace near Sans Souci, and his designing the new or marble palace at Potsdam commenced 1763 and finished 1796 by Gontard—they are apparently different names for one edifice. It is added that the king, against Legeay's advice, insisted on having a window opening to the floor as the only door to the palace; and that as the architect put his hand on his sword hilt when the king raised his cane while the matter was argued, Legeay was obliged to leave. THIÉBAULT, *Frédéric*, 8vo., Paris, 1827, i, 277, states he left Prussia 1763 for Schwerin, went to Rostock, and returned to Paris, where he is supposed to have died. E. L. Boullée studied under him. DUSSIEUX, *Artistes Français*, 8vo., Paris, 1851, p. 67. G. L. Legeay, an engraver, lived about the same period.

LEGEN, in Tunis, see THYSDRUS.

LEGEND (from Latin, *lego*, to read). A name often given to the inscriptions on scrolls in mediæval architecture; CARROLL; SCROLL; as well as to the inscription on a medal.

LEGENDA (. . .) constructed with D. Fontana 1575 the church of the Trinità de' Scozzesi now S. Tommaso degli Inglesi (S. Thomas of Canterbury), at Rome, at the cost of cardinal Norfolk; LETAROUILLY, *Rome Moderne*, fol., Paris, 1825-49, p. 386, pl. 180, which is a plan only.

LEGERI (DYMENGE DE), see DYMENGE.

LEGET (ROBERT), was appointed 21 Feb. 1461 by letters patent from king Edward IV in the first year of his reign, to the office for life of master mason at Windsor castle with the wages of sixpence per day. He was excluded from the operation of the act 4th Edward IV (1464), given in the ROLLS OF PARLIAMENT, fol., London, 1767-77, v, 539. The appointment was confirmed 1483 by Edward V; Harleian MS., 433, fol. 39 b (N^o. 365). A writ 15 May, 1 Richard III (1483), recites the above letters of 1 Edward IV, and directs that as the fee of 6d. per day was the same as that paid during the time of Edward III and Richard II, the same was to be paid him from the said 21 February during his life; TIGHÉ and DAVIS, *Windsor Castle*, 8vo., London, 1858, i, 409.

LEGHORN, in Italy, see LIVORNO.

LEGRAND (JACQUES-GUILLAUME), see GRAND (J. G. LE).

LEGWOOD. The term used in Cambridgeshire and adjacent counties, for "lop and top" in cutting trees. It is applied to the arms or small branches (perhaps from the size of a man's leg) such as are chopped or sawn up into billets for firewood. UNDERWOOD.

LEIGHLIN or OLD LEIGHLIN. A village, formerly a city, situated near Carlow in Ireland. It is a bishop's see founded by S. Lasarian, abbot of Leighlin, circa 630. The see of Ferns was united to it in 1600, as well as that of Ossory after 1840. The cathedral, dedicated to S. Lasarian, was rebuilt 1527 by bishop Saunders, and now serves as the parish church. It consists of a nave 84 ft. long, and a choir 60 ft. long by 21 ft. wide; the belfry tower is 60 ft. high with a slated spire.

LEIRIA. A city in the province of Estremadura in Portugal. It is situated near the right bank of the river Liz; and is walled, having a castle founded by king Affonso Henriques (1135-85) and still in good condition. It became the see of a bishop 1545 in the reign of John III, and has repeatedly been occupied as a residence by the kings of Portugal. The cathedral, dedicated to the Assumption of the Virgin Mary, is quite modern, and was nearly completed in 1854. Two parish churches of no interest; a good episcopal residence; a college; a diocesan seminary; three monasteries with many others suppressed, most of them with towers; and a hospital, are the other chief structures. In the street between the castle and the cathedral is a good Romanesque doorway; the beak-head moldings are well preserved. Leiria is famous for its forests of pine trees planted by king Diniz (1279-1325) to stop the incursions of the sand which threatened to overwhelm the city; the original trees were brought from the Landes in Gascony. VIVIAN, *Scenery*, fol., Lond., 1839, gives a view of the town. 28. 50. 96.

LEITMERITZ (the ancient Litomerice). A town near Prague in Bohemia, situated on the river Elbe, and crossed by a bridge 843 ft. long, of timber and stone. It is surrounded by a moat and walls having three gates, and though old is well built. It is the see of a bishop; contains a cathedral dedicated to the protomartyr S. Stephen, built by duke Spitignev (circa 1624-74?); the allerheiligen kirche; and six or eleven other churches; a Dominican, and a Capuchin monastery; a good town house; an episcopal palace; a diocesan seminary; a gymnasium, formerly a Jesuits' college; two hospitals, and an infirmary, with the usual civil and criminal courts, and public offices. 14. 26. 50. 96.

LEITRER (HEINRICH DER), was *baumeister*, 1332, at the münster of Freiburg im Breisgau. 92.

LEJAI (J.), properly LEGEAY (J.)

LELEGEFOLIS. A former name for APHRODISIAS in Asia Minor.

LELOIR (. . .), designed 1812-20 the abattoir near the barrière de Ville-jui at Paris, given in GOURLIER, etc., *Chûtes d'édifices*, etc., fol., Paris, 1837-44, i, pl. 173. He died in or before 1837.

LELONG (PAUL), designed 1830 the bazar de l'industrie, boulevard et rue Montmartre, at Paris; NORMAND, *Paris Moderne*, 4to., Paris, 1843, ii, pl. 139-40. He died at Paris in 1846; a Charles Lelong was then alive.

LEMAIRE (. . .), see MAIRE (. . . LE).

LEMAISTRE (. . .), see MAISTRE (. . . LE).

LEMATON (JOHN) was appointed 27 July 1118, 26 Henry VI, clerk of the works at Berwick-upon-Tweed, Roxburgh, and Carlisle, with a fee of twelve pence, and two shillings per day for horse hire, to superintend the repairs of the castles and buildings; the writ is given at length in RECORD COMMISSION, *Rotuli Scotia*, fol., London, 1819, ii, 332-3.

LEMBERG (Polish *Lwów*). The capital of the kingdom of Galicia, in Austria. The sites of the walls and ditches now form promenades; and though founded in the thirteenth century the city has of late years presented a more modern appearance, the streets being broad and straight, with lofty stone

houses and many good buildings. Only a small stream called the Peltew, which is dry in summer, passes through the city, which is the residence of the Roman Catholic, Armenian, and Greek archbishops, of the Lutheran superintendent, of a chief rabbi, and of the governor-general, and the seat of all the chief military and civil authorities of the kingdom.

The Greek metropolitan cathedral and archbishop's palace are magnificent structures in the Italian style; the Armenian cathedral and archiepiscopal palace is a widely praised structure; the Latin or Roman Catholic cathedral and former Jesuit church is in the taste of that Order; the Dominican church is designed after the model of the church of S. Carlo at Vienna: there are also about twelve other Roman Catholic churches; the Protestant church; the Lutheran church; and three synagogues, one of recent erection, of large dimensions, and remarkably handsome. About 1836 there were only nine convents existing out of thirty-three establishments.

Amongst the other public edifices are, the governor's palace; the town house erected 1828-35 on an extensive scale with a tower 42 klafter (about 261 ft. Eng.) high, at a cost of £60,000; the university, having a library of 48,000 volumes and numerous collections; the Ossolinsky institute with a library of 58,000 volumes, 1,200 MSS., and collections of coins, medals, paintings, engravings, antiquities, etc.; the new theatre erected at the expense of a count who bequeathed all his property for its maintenance; a large new house of correction; a general infirmary and lunatic asylum; a large military hospital; extensive barracks, etc. 14. 26. 50.

LEMNOS, see LABYRINTH.

LEMOINE (JEAN PHILIPPE), see MOINE (J. P. LE).

LEMONNIER DE LA CROIX (. . .) designed 1831 the theatre at the Pointe à Pitre, in Guadeloupe, NORMAND, *Paris Moderne*, 4to., Paris, 1843, ii, pl. 134-6; 1841 a country-house near Auxerre, 1849, iii, pl. 84-7; and 1844 the hot-house and kiosque at Gennevilliers, pl. 49-50.

LEMON YELLOW. This colour is the purest yellow, and is beautifully light and vivid. In body and opacity it nearly equals Naples yellow, and masticot; but is much more pure and lucid in colour and tint; and at the same time not liable to change by damp, sulphurous or impure air, or by the action of light, or by mixture with white lead or other pigments, either in water or in oil. It is represented by yellow orpiment, and uran ochre; ANSTED, *Elementary Course*, 8vo., Lond., 1850, p. 156.

LEMOREAU (. . .), see MOREAU (. . . LE).

L'ENFANT (. . .), a native of France, was a major in the army of the United States of North America, and "employed 1789 to rebuild after a design of his own the old city hall, in Wall-street, New York, fronting Broad-street, making therefrom the Federal hall of that day. The new building was for the accommodation of Congress; and in the balcony, upon which the senate chamber opened, the first president of the United States was inaugurated. It projected into Wall-street, and the foot passage was under the balcony made sacred by the above-mentioned inauguration. It likewise projected into Nassau-street. The late custom-house was upon a part of the site of Federal hall, as major L'Enfant's building was called; and the great custom-house now erecting has likewise its foundation on a small part of the same building. When Congress removed to Philadelphia, major L'Enfant accompanied them." It is doubtful if any public building was designed by him, but he "commenced the enormous house for Robert Morris, the great financier of the Revolution, the foundation of which exhausted a fortune; and which, being discontinued, is now the site of a large square or block of elegant houses." The site of the capitol and city of Washington was chosen as the seat of government of the United States by the president after whom it is named; was laid out by Ellicott, Roberdeau, and the Kings, from a plan made by L'Enfant, "who was too proud to accept such a compensation for his services as his friends and president Monroe thought just, be-

cause less than what he claimed, yet accepted an eleemosynary support from Mr. Digges and others till his death." DUNLAP, *History*, etc., 8vo., New York, 1834, i, 338.

LENGTH. The distance between any two points. The definition of a line in Euclid is "length without breadth, the extremities of a line are points;" and that of a point is "that which hath no parts, and hath no magnitude."

The subject of particular measures of length is treated under MEASURE.

Length is generally applied to the longest side of a horizontal plane in contradistinction to the least dimension, which is called *width*. Also to the horizontal measurement of a vertical plane, as the side of a room, in contradistinction to *height*. A. A.

LENGTHENING TIMBER. As timbers are often required to be of greater lengths than the balks usually imported measure, it becomes necessary to elongate them. This is sometimes done by putting the pieces end to end, and nailing or bolting flitches to each side. Sometimes they are halved on to each other and bolted through. The best and soundest way is to scarf them together. Where ribs of great length are wanted it is a good plan to put them side by side in thicknesses, taking care that no two butt joints occur in the same line. FISH; SCARP. A. A.

LENO (GIULIANO), from 1509 or earlier, assisted Bramante, who seems to have employed A. (Picconi) da Sangallo from 1507 till 1512, or later, in making drawings of works to be executed by Vitoni and Leno. The reputation acquired by the latter was considerable, according to VASARI, *Lives*, ii, 442; iv, 10, 31, who once calls him Lemi: that author states that Bramante left behind him this household friend (*domestico amico*) who was much more employed in providing the materials and execution of structures designed by other people than in working for himself; undoubtedly he had judgment and great experience. Moreover, Giulio Romano, about 1523-27 painted in the hall of Constantine at the Vatican, in bronze-coloured relief, the erection of S. Peter's by Constantine; and in it included a portrait of Leno holding a plan of the new cathedral (begun 1506) and attending Bramante. In 1526 Leno was inspector (*sollecitore*) of the fortifications, at Parma and Piacenza, which were arranged with him by A. da Sangallo, Pier Francesco da Viterbo, and M. da Sanmichele. 5. 30. 73.

LENOIR (NICOLAS), was born about 1726 at Paris. He studied under Blondel, and whilst still young obtained the grand prix of the academy. According to MÜLLER he went to Rome to continue his studies, and was on his return called "*le Romain*," NAGLER states that it is not known if he went to Italy at all. While at Dijon he designed the porte S. Nicolas at Beaune, which was commenced 5 Sept. 1762 and completed 1764; the extensive buildings of the abbey of Cîteaux, near Dijon, were commenced about 1772 on his designs, but not entirely completed at the time of the Revolution, when they were partly destroyed; the remainder was lately used as a beetroot sugar factory; both these erections are shown in MAILLARD DE CHAMBURÉ, *Voy. en Bourgogne*, fol., Dijon, 1833, i, p. 9; 40. He designed the château de Ferney for Voltaire, views of which are given in LABORDE, *Tableaux de la Suisse*, fol., Paris, 1780-86; built 1781, in fifty-six days, the théâtre de la porte Saint Martin, of timber, given in KRAFFT, *Choix de Maisons*, etc., fol., Paris, 2nd edit., 1838, pl. 94-5; the roof in KRAFFT, *Plans, etc., de la Charpente*, fol., Paris, 1805, pt. 2, p. 20, pl. 57; which work, pt. 2, p. 21, pl. 60, also gives the roof of the théâtre de l'opéra des arts: 1790 the théâtre de la cité, now called le Prado, in the *place* du palais de justice: and the market in the faubourg S. Antoine, called the marché de Baveau. He died at Paris in 1810. 110. 116.

LENÔTRE (ANDRÉ), see NÔTRE (ANDRÉ LE).

LENTIL, now written LINTIL.

LENYNG PLACE. The old way of writing LEANING PLACE. 16. 19.

LEOCRATES, son of PYRRHUS, see LAKRATES. 117.

LEON. The capital of the province of the same name in Spain, is situated in an angle formed by the confluence of the rivers Torio and Bernesga, each of which is crossed by a bridge. The city, built in the form of an octagon, is surrounded by ancient walls in a dilapidated state, and entered by eleven gates; it was for more than two centuries the residence of the kings of Christian Spain. The streets are narrow, irregular, ill-paved and dirty; with many of the houses in a state of decay: the streets called Nueva and Plegaria, or Bajada de San Martin, have been widened and rebuilt; four principal squares are lined with fine houses, while that called the plaza mayor or plaza de la constitucion, is remarkable for the regularity of its form and a fine front of balconies: the espolon de puerta Castillo is well planted and forms an agreeable promenade. The fountains in the public squares, some of them composed of marble and jasper, with allegorical figures, are of good design.

The cathedral, dedicated to the Assumption of the Virgin, although one of the smallest in Spain, is ranked one of the seven most celebrated of its class in that country, and is characterised as the *pulchra Leonina ecclesia*. It is considered a good example of the Gothic art of the thirteenth century of that country, although declared by STREET to be thoroughly French in detail, plan, and design. The plan mainly consists of a groined nave and aisles of six bays, transepts, a choir of three bays, and a chevet of five sides with a surrounding aisle and pentagonal chapels beyond. The present edifice was commenced 1199, probably by P. de Cebrian, who had been "master of the works" in its predecessor; maestro Henriquez "magister operis", who died 9 July 1277, is supposed to have been his first or second successor; Guillen de Roan who died 14 December 1430 was also employed there; the construction of the second tower, which is not uniform with the earlier one, is attributed to Juan de Badajos who, 1513 was master of the works. The hexagonal dome was added in the middle of the eighteenth century. The retablo mayor was designed about 1730 by Narciso Tomé, but executed by his nephew Simon Tomé Gabilan.

This structure is wonderful for its lightness and goodness of construction; the walls having been very largely perforated for light, occasioned the building up of the outer lights both of the clearstory and triforium to save the edifice from falling. The four windows over a blank arcade along the aisle wall have also been filled with masonry up to the springing of the arch; the nave is lighted from the clearstory by six windows on each side, each window having four bays about 40 ft. high with three foiled roses in the head; these windows are full of fine stained glass, of the richest possible colour, most of it of the same date as the building (STREET). The double openings of the triforium appear to have been originally glazed (the mode of obtaining the light is described in STREET, p. 112), but all the openings are said to be now walled up, though STREET does not state that they are so. The interior is very simple, sculptured decoration having been reserved for the doorways, windows, *penacheries*, etc., of the exterior, where, between the lofty west towers of the fifteenth and sixteenth centuries, having short spires, are four windows under a circular one (*espejuelo*); in the north transept is a second one, and another in the south transept was replaced by a double window when it became dilapidated. The woodwork of the choir is fine and of fifteenth century date. The cloister placed on the north side is greatly mutilated, but the bays all round still contain a good series of paintings illustrative of the New Testament. The chapel of Santiago at the east side of the cloister is of the fifteenth and sixteenth centuries. There are some good regal tombs of old date; the most elaborate one, which is a work of the fourteenth century, being that to Ordoño II, the original founder of the old structure. A plan of this edifice is given in STREET, *Gothic Architecture*, 8vo., London, 1865, p. 105-21, who shortly previous saw the south transept being rebuilt by Lavinia in con-

sequence of its threatened fall. His illustrations of one bay of the nave, and his description, differ from the careful account and plates given in Risco, *Historia de Leon*, 4to., Madrid, 1792, p. 63, who gives the elevations and a section, and states that it is 308 Spanish ft. long inside the walls, 84 ft. wide in the nave and aisles, and 128 ft. wide in the transepts. STREET gives the total internal length as about 300 ft.; and width of nave and aisles 83 ft.: the height, to springing of main arches 25 ft. 6 ins., to floor of triforium 46 ft., and to the centre of the groining about 100 ft. Only the plan and west front of this building are given at present in the Spanish government publication, *Monumentos Arquitectonicos de España*, fol., Madrid, 1859-64.

The abbatial church of S. Isidoro 'el real' was commenced a little before 1063 by Pedro de Dios, whose high tomb (circa 1065-7) was allowed to be placed in the nave where now a stone only records his name. The church was fit for the reception of the body of S. Isidoro in 1065 and had then three altars; in 1149 it was consecrated, though PONZ, *Viage de España*, 12mo., Madrid, 1785-94, xi, 234, notices an inscription in the cloister which gives the date 1063 for the dedication. It is cruciform in plan with apsidal chapels on the eastern side of the transepts; the nave and aisles are six bays in length, and there is a tower detached to the west: a chapel dedicated to Sta. Catalina now called 'El Panteon' is at the north-west end of the church; and a capella mayor or choir 1513 or a little later, by Juan de Badajos, takes the place of the original apse. The whole of the nave has a waggon vault. The cloister on the north side is large and modernized. STREET, p. 121-8 gives a plan and views: only the plan and details of the church, and plan, section, and details of the panteon, are at present given in the above-named Spanish government work. The church of the Benedictine monastery of S. Clogo (Claudio) was begun 1582-1600 by J. de Ribero, continued by Juan de Nantes till 1607, but never completed: the sacristy was designed 1568 by F. de Villaverde. There are two parish churches, and four nunneries, with several suppressed religious establishments including the royal monastery of S. Marcos, which belonged to the order of Santiago; part of the present façade, including the portal, was executed 1537-43 under J. de Badajos, and the other half was completed 1715-19 on the same design by M. de Suinaga. Among the chief public edifices are the episcopal palace; the diocesan seminary; the casa (consistorial, or) del ayuntamiento with two towers, built 1585 by J. de Ribero; the mansion called the casa de los Guzmanes; the public library formerly a nunnery; the theatre; several hospitals or almshouses; the gymnasium for superior general education, and several other schools. 50. 66. 96.

LEON. The capital of Nicaragua, in Central America. It was founded 1523 but subsequently removed to near the site of a large Indian town called Subtiaba, in 1610. The city is laid out on a regular plan in spacious paved streets with intervening squares, but many are in ruins. The houses are built of *adobes* and seldom consist of more than one story: but each encloses a spacious *patio* or court, planted with trees and entered by a *puerta* or *zaguan* or portal, often lofty, of moresque, or of classic, character. Elaborate windows projecting 2 or 3 ft. into the street and guarded by iron balconies, form another feature in the otherwise blank outside wall. Numerous springs rising in the deep ravines afford a copious supply of pure water. A bold stone bridge across the ravine to the south of the city has not been fully completed.

The large and massive cathedral, dedicated to S. Peter, is regarded as second to no similar structure in the once Spanish American States. It was rebuilt 1706-43, of cut stone with stucco ornaments, and is said to have cost five million dollars. The interior is plain, with a lofty central dome; two wide towers with pyramidal tops flank the façade; the whole structure presents the appearance of a fortress, and in 1823 it is said to have had thirty pieces of artillery at one time on its roof, which is composed of massive arches. The churches of La

Merced, the Recolection, and Calvario, are remarkable for their size and façades; their convents have been abolished: there are also about ten or twelve other churches of less size. The public edifices, which are considered among the finest in Central America, consist of the episcopal palace built of adobes and tiles, entered by a portico of good proportions, and surrounded by gardens; the Tridentine college of S. Ramon, established 1675, once a flourishing institution; the government house; the *cuartel general*, or head barracks; and the hospital occupying the old convent of San Juan de Dios. Some travellers, however, appear to consider that there is nothing worth looking at in the city.

The existing portion of the old Indian town possesses a large church, second only to the cathedral, having three naves divided by cedar columns with gilt capitals, and having lofty towers; with several other public buildings. SQUIER, *Nicaragua*, 8vo., New York, 1852, i, 257-343, giving a plan of a house, a view of the cathedral and the church of La Merced, and of the Indian church, etc.: BAILY, *Central America*, 8vo., London, 1850, p. 116; DUNLOP, *Central America*, 12mo., London, 1847, p. 9.

LEONHARD (MEISTER), was *werkmeister*, 1432-34 on the tower of the cathedral at Frankfurt-am-Main, begun 1415 by GERTENER.

LEONI (GIACOMO), a Venetian, born about 1686, was appointed architect to "his most serene highness the elector palatine," and is supposed to have been brought to England by R. BOYLE, earl of Burlington, to superintend the translation of *The Architecture of A. Palladio; book iv, parts i and ii, Ancient Temples of Rome*, etc.; the whole revised, designed, and published, by G. L., 2 vols., fol., London, 1715-16: it appears to have been translated by "N. du Bois, architect and one of his majesty's engineers," who, in the preface states that Leoni "had spent several years in preparing the designs, having seen most of the originals of those designs in the second, third, and fourth books." It was advertised to contain the "notes and remarks of Inigo Jones from his original manuscript in Worcester college library, Oxford", but they did not appear until the "third edition corrected" in 1742, with an appendix by Palladio, *On the Antiquities of Rome*, etc. Later he translated and published *The Architecture of L. B. Alberti*, 3 vols., fol., London, 1726, which was reprinted of a smaller size, fol., London, 1755.

It has been considered that Leoni may have assisted Lord Burlington in the design for the south façade and the quadrantal colonnades of his house in Piccadilly. With the first edition of *Alberti*, he published a short description of the then state of architecture and building in England, with twenty-seven plates of his own designs; e.g. pl. 1-2, 1719 a triumphal arch, 120 ft. square, for James, earl of Stanhope, to the memory of king George I., to be erected in the centre of the ring in Hyde-park: pl. 14-5, 1721 the town house in Old Burlington-street, for the duke of Queensberry and Dover, which Lord Burlington allowed to face towards his residence (this was rebuilt 1790-2 by J. Vardy): pl. 18-9, 1721 a country-seat in the style of Palladio: pl. 16-7, 1723 a country-seat in the style of Inigo Jones: pl. 3-13, 1723 the house at Carshalton-park, in Surrey, for Thomas Scawen, Esq.; with three plans dated 1727 of a reduced design and an orangery; although this stupendous building had "the materials now ready" and was commenced, it appears soon to have been discontinued; BRAYLEY, *Surrey*, 4to., London, 1841, iv, 66; LANGLEY, *London Prices*, 8vo., London, 1747, xii: pl. 20-6 give three designs for houses; and pl. 27 for a bridge having shops and porticoes.

The earliest building attributed to him (it is said to have been designed by an Italian, and to have been completed 1710) is Braman or Bramham-park, near Leeds and Wetherby, Yorkshire, for Robert Benson, first lord Bingley, now belonging to George Lane Fox, Esq.; a wing was destroyed by fire, and the house gutted many years since (1865); CAMPBELL, *Vit.*

Britt., fol., London, 1725, ii, pl. 27; NEALE, *Seats*, 1822, v. In 1720 he rebuilt Moor-park, near Rickmansworth, Hertfordshire, for Benjamin Hoskine Styles, Esq., afterwards the seat of — Williams, Esq., and now (1868) of Lord Ebury; Sir J. Thornhill acted as surveyor, and completed some of the rooms with painted decorations, for payment of which he had to take law proceedings (WALPOLE, *Anecdotes*, s. v.); the building is said to have cost £150,000, the carriage of the stone from London amounted to £13,800; the centre part now only remains, the wings forming the chapel and offices having been taken down by Thomas Rouse, Esq., the possessor of the property between 1787 and 1799; WOOLFE and GANDON, *Vit. Britt.*, fol., London, 1771, ii, pl. 55-6; NEALE, *Seats*, 1820, ii; ACKERMANN, *Repository of Arts*, 8vo., London, 1825, v, 127. Leoni commenced 1725, on the site of the ancient castle, Latham house and offices, Lancashire, for Sir Thomas Bootle of Melling, now the seat of his descendant the Rt. Hon. Lord Skelmersdale, WOOLFE and GANDON, *Vit. Britt.*, 1767, i, pl. 98-100; NEALE, *Seats*, 1823, ii; the fine bold ceilings are shewn in TWYGCROSS, *Mansions of England*, 4to., Lond., 1847, iii, p. 16-20. At Lyme-hall, near Manchester, Cheshire, for Peter Legh, Esq., now the seat of Thomas Legh, Esq., he designed 1726-32 the south front, added the casing to the wings of the north façade, encased the inside quadrangle with stone, and made other considerable alterations; TWYGCROSS, *Mansions*, 1850, v, 92-8; NEALE, *Seats*, 1824, 2nd ser., i; ATKIN, *Manchester*, 4to., Lond., 1795, p. 440. He completed 1730 Bold-hall, near Warrington, Lancashire, for Peter Bold, Esq., afterwards the seat of Henry Hoghton, Esq. (sold by auction in July 1858); TWYGCROSS, *Mansions*, iii, 27-8: built 1731 Clandon-park, Surrey, for the second earl Onslow; the stables are by L. Brown; ACKERMANN, *Repository*, 1828, xi, 126; NEALE, *Seats*, 1826, 2nd ser., iii: about 1740 Burton or Bodecton-park, Sussex, for Richard Biddulph, Esq., destroyed by fire in 1862; NEALE, *Seats*, 1824, 2nd ser., i: Moulsham-park, Essex, for Benjamin, earl Fitz Walter; WOOLFE and GANDON, *Vit. Britt.*, 1767, i, pl. 31-5: and at Stowe, in Buckinghamshire, two gateways into the gardens by the north front of the house.

Leoni died 8 June 1746, aged 60 years, and was buried in S. Pancras old churchyard, Middlesex; LYSONS, *Environers*, 4to., London, 1795, iii, 355. His two sons, John Philip, and Joseph, do not appear to have followed the profession.

LEONTARIUM (Gr. λεονταριον). A laver or supply of water, not for ablution but for lustration, or as a symbol of purification, when placed in the atrium or courtyard of a basilican church sometimes surrounded with lions spouting water, whence it had this name in some relatively modern Greek writers, as observed by DU FRESNE DU CANGE, *Gloss.*, s. v.

LEOPARDO (ALESSANDRO), born about 1450 at Venice, chiefly practised as a sculptor and founder. Of his works in architecture nothing more is known than a design or model 1508 for the scuola della Misericordia, which was continued by P. Lombardo. According to MILIZIA, he took a part with Briosco (but ROSETTI, *Padova*, 8vo., Padua, 1765, p. 190, says with A. Morone) in the construction of the church of Sta. Giustina, at Padua. He died in 1510 or in 1515. 5. 69.

LEOPOLDINIA, see JARA.

LEOU. The name given to a building in China of several stories; of which sort are almost all the small palaces built by the emperors in their pleasure gardens. At one time such places were constructed from 150 ft. to 200 ft. high, flanked by towers extending to 300 ft.; but these structures are now seldom erected. 1.

The term "leou" is given to the upper floor (when built) of houses in China, as noticed s. v. Chinese Architecture, in *Detached Essay*, p. 4.

LE PAUTRE (ANTOINE), see PAUTRE (A. L.)

LEPERE (JEAN BAPTISTE), born 1 Dec. 1761 at Paris, and educated (through the poverty of his family) in an école gratuite de dessin, studied in the cours public the higher mathematics,

physics, and chemistry, while he served an apprenticeship to several trades necessary in the mechanical arts and in building. He went 1787 to S. Domingo, where several large houses were built by negro workmen under his tuition. Returning 1789 to Paris he obtained some private practice, and learnt the theory of perspective by assisting Antoine in composing and drawing part of the scenery for the new théâtre de la Comédie-Française. He was one of the seventy persons chosen to help in the establishment of a cannon-foundry at Constantinople, who were driven ashore at Genoa, and one of the forty of that band, who went by land through northern Italy, Dalmatia, and Bosnia to their destination. After two years service he returned to Paris, and 1798 was one of the party engaged in preparing the materials for the *Description de l'Égypte* to which he contributed more than fifty plates, with materials for others, although engaged at the same time in designing, by order of Kléber, a large hospital for Alexandria, and by order of Buonaparte a portico to surround the space called the Esbekiyeh at Cairo.

He was appointed 1802 architect to the château de la Malmaison: and 1805 had the opportunity of showing a mode by which, without the full-sized model proposed by its designer Gondoin, the colonne de la Grande Armée could be constructed in the place Vendôme, at Paris. His calculations of the shape and size of each piece of bronze, and his contrivances for fixing them without fastening them by lead to the stone work, with his precautions against expansion and condensation, procured his appointment to execute the work in conjunction with Gondoin, who left the entire management to him. The stonework of the column cost 1,347,000 francs, and 628,417 francs for the bronze with which it is covered; it was completed 25 August 1810. The bronze statue of Napoleon I by E. Sœurre placed on the summit in 1831 cost 60,000 francs; the basement of Corsican granite was added 1835 at a cost of 76,000 francs; GOURLIER and others, *Choix d'édifices*, etc., fol., Paris, 1837-44, i, pl. 155-6.

Lepère arranged the fête given 23 June 1811 on the birth of Napoleon's son: was appointed in that year architect to the palace of S. Cloud, for which he designed the new building of the *grand commun*; and from that year until 1814 was engaged in preparing for the execution of his projected obelisk to be carried, in small blocks of granite invisibly joined, to a height of 180 ft. on the Pont Neuf at Paris, where he subsequently executed the pedestal for the statue of Henry IV. His appointment 1822 as architect to the château at Fontainebleau was cancelled at the revolution of 1830, but he retained that of architect 1824 to the church of S. Vincent de Paul at Paris, in which he was assisted, from the beginning, by his son-in-law J. I. Hittorf; the roof of the church 1838 is given in KRAFFT and THIOLETT, *Traité de la Charpente*, fol., Paris, 1819-40, pl. 13. Three months before that building was opened he died 16 July 1844. He was a chevalier of the Legion of Honour.

As an artist, he designed most of the medals which Denon ordered to be struck in commemoration of the incidents of the empire: as an engineer, he designed the apparatus for lifting the statue of the emperor to its place on the column already mentioned: and as a mechanic he invented a remarkable mode of tuning the pianoforte by sight without hearing. DALY, *Revue Générale*, 4to., Paris, 1844, v, 367.

LEPER HOSPITAL, see LAZAR HOSPITAL.

LEPIDOSTACHYS Roxburghii, the cocoa, cocus, or kokra wood. This wood is imported from Cuba and the West Indies in pieces from 2 to 8 ins. in diameter, and from 3 to 6 ft. long: though of a light brown colour when cut, it soon changes to deep brown and sometimes to almost black, and is extremely hard. It is used for turning and for musical flutes. An apparent variety, the heart being of a chestnut brown colour, and the hard sap that of beechwood, is used for trenails and pins. This wood must not be confounded with the cocoa nut (cocos), and the cocus wood of commerce. (AMERINUM.) HOLTZAPFEL, *Woods*, 8vo., London, 1843, p. 80, gives an ac-

count of its many varieties. ARCHER, *Popular Econ. Botany*, 8vo., London, 1843, p. 338.

LÉPINE (JEAN DE), see LESPINE (J. DE).

LEPORARIUM. The Roman name for a walled paddock, planted thickly with shrubs to give shelter, and intended as the name implies, for the reception of animals of the hare kind; SMITH, *Dict. Antig.*, 1851, p. 69.

LEQUEUX (MICHEL JOSEPH) was born 25th December, 1756, at Lille. He made the designs for many buildings in his native town; the principal of which are: the intendance or governor's house; the theatre; and the hôtel des comptes. The palais de justice at Douai, was also constructed after his designs. He died 15 April 1786.

LERÀ (BERNARDO DA), incorrectly called Dalera, Dallera, and di Lera, was employed as assistant architect in 1496 and subsequent years in the construction of the marble palazzo (Raimondi now) Crotti near the church of S. Luca, at Cremona. According to BRESCIANI he rebuilt the church of Sta. Agata; constructed the house (recently dei Stanga) of the Meli Lupi of Soragna, near the church of S. Vincenzo, as might once have been read in the inscription on the frieze of the said house which bore the name of Girolamo its owner, as well as of the architect; and the palazzo of Gabriele Meli, on the piazzetta di S. Michele, occupied in the time of BRESCIANI by the Podestà and the Curia; and had a part in the present palazzo pretorio; GRASSELLI, *Abecedario*, 12mo., Milan 1827, p. 112; CAMPO, *Cremona*, 4to., Milan, 1645 and 1642, p. 198.

LERCH (NICOLAS) shortly before his death 1493 at Vienna, was engaged upon the cathedral at Strasburg. 92.

LERIDA (the ancient Ilerda). The capital of the province of Catalonia, in Spain. It is a place of great strength, being surrounded by moated walls flanked with bastions, as well as defended by a castle and several batteries; but it has suffered so greatly in war that many parts are in a ruinous condition: the houses, although very substantial, and usually three and four stories high, are frequently in a dilapidated state: the streets, with very few exceptions, are narrow, winding, and ill-paved: near the church of S. Juan is a Romanesque house of unusually good style, three stories in height; it appears to have been adapted as the exchange in 1589. There is a large stone bridge of seven arches, the foundations of which are said to be Roman, over the Segre.

There are two cathedrals; the ancient one, dedicated to the assumption of the Virgin, had the first stone laid on the gospel side of the choir 22 July 1203, and was consecrated 31 October 1278: it is chiefly of twelfth century art, and remains almost as built; it presents a mixture of Byzantine, Gothic, and Moorish architecture. The portal is formed of four concentric arches, with curiously sculptured columns, and Byzantine windows of great interest as specimens of early art. Pedro de Peñafreyta who died 1296 had been master of the works, and had probably been employed on the central lantern, and the "enormous" cloister at the west end, begun before 1215, for which work the king don Jayme II gave the stone 21 August 1310. About 1320 bishop Guillen founded a chapel (probably one of those on either side of the great south door, or on the east side of the south transept). In 1323 the cloister and tower were still building. In 1490 F. Gomar contracted for the erection of a grand porch for 1600 sueldos. The steeple at the south-west angle of the cloisters seems to have been commenced about the end of the fourteenth century; in 1397 occur the names of Guillermo Qolivella and Carlos Galtes de Ruan, as masters of the works; it was probably completed before 1416-18, when the great hall on the north side of the cloister was contracted for and finished; this building has a pointed arched stone roof and is lighted from one end only. The external roofs are all of stone, those of the choir and lantern being original. Near the north side of the cathedral is a fragment of the same age, containing a hall 96 ft. by 24 ft., groined in hexapartite vaulting, with other works adjoining it (STREET, p. 359).

In 1414 P. Balaguer was sent from Valencia to examine the tower before he built the tower called Miralet in his own city.

The old cathedral having been 1707 turned into a fortress by the French, don F. Sabatini directed the building of a new one, which was designed *cir.* 1760-90 by don P. Cermeño. It is of great size, has a nave and two aisles, with piers and pilasters of the Corinthian order, but there are columns at the entrances to the chapels, in which the retablos and sculptures were executed by Juan Adan; its *retablo mayor* was designed by don M. Martin Rodriguez. The church of S. Lorenzo, an ancient building in the upper part of the city, is supposed to consist partly of a Roman temple; it is a parallel triapsidal church, with a vaulted nave of three bays. The church of S. Juan, on the plaza near the bridge, attributed to the time of Constantine the Great (306-337) is remarkable for its Byzantine porch; it is of the same date as the cathedral, and perhaps a little later than the church of S. Lorenzo. 66.

The episcopal palace; the town-house; the court-house; the prison; the gymnasium or *instituto*, the theatre, with the civil and military hospitals, are among the other buildings of the city. SAINZ DE BARANDA, in FERNANDEZ DE NAVARRETE, *Espana Sagrada*; *Colleccion de Documentos*, etc., 8vo., Madrid, 1842, etc. xlvii: STREET, *Gothic Architecture in Spain*, 8vo., London, 1865, pp. 346-61.

LE ROUX (JACQUES), see ROUX (J. LE).

LE ROY (JULIEN DAVID), see ROY, (J. D. LE).

LESBIAN MARBLE, see MACULOSUM MARMOR.

LESBIAN MOLDINGS. It is almost agreed that the *astragalum Lesbium* of VITRUVIUS, iv, 6, was a bead and reel molding. VON LASSAULX, in Appendix to KLEIN, *Rheinreise von Basel bis Düsseldorf*, 16mo., Coblenz, 1846, p. 179, as quoted in WHEWELL, *Arch. Notes*, 3rd edit., 8vo., London, 1842, p. 199, notices "the pillars (at Oberbreisig), the imposts of which are profiled according to the Lesbian form; which, indeed, in the members of our buildings in this region, is not of rare occurrence;" in this case it does not appear whether the *cyma recta*, *cymatium* of the French writers, is meant, or some other profile which the writer ought to have better defined. It has been suggested *s. v.* *cymatium* that the *cymatium Lesbium* of VITRUVIUS was the *cyma recta* broken, although his commentators have almost unanimously called it a *cyma reversa*.

LESBIAN WALLING. This must have been a term widely circulated among the Greeks; and would seem to have expressed that phase of CYCLOPEAN or PELAGIC building which showed a trapezoidal network of joints on the face of the work; for ARISTOTLE, *Ethica*, v, 10, mentions as a matter known to his contemporaries, B.C. 395-22, that the leaden rule of a Lesbian builder was altered to suit the shape of the stone. He evidently alludes to the mason's use of a leaden template, as a measure of an angle and perhaps of a side, in lining out any block that was to be fitted to another; and this passage intimates the comparatively late period at which such work might have been executed at Athens, Cnidus, Mycenæ, Rhamnus, and Thoricus, as well as at Aperlæ. POLYGONAL WALLING.

LESCHE. The Gr. λέσχη meant not only "parley" but, in the earliest historic times, a building which might very well be denominated by French writers a "parloir." Two such edifices at Sparta are mentioned without details by PAUSANIAS: one of them, iii, 15, being named the "lesche pœile"; the other, iii, 14, the "lesche of the Crotani," (dwellers in the district called Pitane in Laconia, iii, 16), whence it would seem to have been their "house of call" when visiting the capital. The same author, however, describing, x, 25, the lesche over (or above) the fountain Cassotis near the temple of Apollo at Delphi, specifies that this example was decorated with a picture by Polygnotus (about 470 B.C.), and that this name was given to the structure because the building was used in olden time (τὸ ἀρχαῖον) for serious and frivolous discourse. Moreover, as if such were not the case when he was writing (about 170 A.D.), he cites HOMER to show that buildings so called (of course

for the same reason) were once common in Greece. Commentators upon HOMER and HESIOD agree that such a place offered a good field for beggars; and the dubious HERODOTUS, *Homerus*, states that the bard recited his verses in the lesche at Cyma. On the contrary, as the term is employed to signify a place of judgment in several passages of ÆSCHYLUS and SOPHOCLES writing in the same age as Polygnotus, it would seem to have had before their time, and until that of PAUSANIAS, a meaning which to some extent differs from that above given; while another may well be inferred from ATHENÆUS, *Deipnosophistæ*, iv, 139, where the term appears to be applied to a triclinium. A modern writer might urge that corresponding localities at present are equally places where there is much talk. Contemporaries of the two last named authors, however, use the term with its earliest signification: it means a place for conversation, in PLUTARCH, *Lycurgus*, 24, and *Quæst. Græc.*; where philosophical and scientific subjects were discussed, according to that author, Περὶ τοῦ Εἰ; and was a favourite resort of elderly men, as noted in the same, *Lycurgus*, 119, and in ÆLIAN, ii, 34. Gossip and chatter were accepted as incidents of the lesche by EUSTATHIUS, PROCLUS, and MOSCHOPULUS; while ANTIPHON, *Orat. cont. Nicoctem*, and HARPOCRATION notice it as the resort of loungers and of idle people generally: it was supposed to be identical with the odeum by CASAUBON, *Strabo*; but this idea was refuted by MARTINI, *Abhandlung von den Oden der Alten*.

Although uncertain that any edifices were raised with the sole object of being a place for conversation and lounging, as well as that such buildings (if any) had a particular form; and although allowing that they might have been of any form, and opened or closed indifferently, provided they were warm, FALKENER, *Museum of Classical Antiquities*, 8vo., London, 1860, i, 81, (whence the authorities here cited are taken), as a believer in the appropriateness of Greek edifices to their specific purposes, and in the probability that buildings were constructed expressly for the above named object, has endeavoured to ascertain the arrangement of such a structure, and defines it as "a long continuous portico, open all round, and having merely a single wall in the middle, in the thickness of which seats or exhedræ are contrived, at sufficient distance apart to preserve their privacy, and separated from each other by statues." He relies to a great extent, in his illustration of his explanation, (which is in fact a criticism of one attempted by RIEPENHAUSEN, *Erläuterung des Polygnotischen Gemäldes*, 4to., Göttingen, 1805, translated into French, fol., Rome, 1826-29), upon the plans recorded of the Roman porticos, including two inserted on the plan of the villa of Hadrian at Tivoli by PIRANESI, who marks one with the word *pœile*; it is certain that a *pœile* was erected in that villa by the emperor; and he assumes that the intercolumniations may have been closed by dwarf walls or by gratings, if one or more doors must be provided.

The critic must admit that, although there were at one time three hundred and sixty buildings at Athens to which the name "lesche" was applied according to PROCLUS, *Hesiodus*, the only information to be derived upon the nature of them from ancient authors is uncertain or contradictory. The length of each side of the painting in the lesche at Delphi would be above 75 to 85 ft., if the figures in the picture were life-size; HESIOD, *Op.*, 493, shows that any close warm room to which people resorted in winter was a lesche; PLUTARCH, *De Orac. Defect.*, vii, 625, alludes to the doors; PROCLUS, *Hesiodus*, and CALLIMACHUS, *Ep.*, ii, 3, show that it was not only warm but sunny; and EUSTATHIUS intimates that it had no doors. But the definition attempted by FALKENER does not fulfil the condition of a closed room, which seems required by the climate in which the Delphian lesche was situated, and by the word οἶκον (used by PAUSANIAS in reference to that building) if that involves, as it seems reasonable to suppose, a vestibule with the needful accessories preceding a large room. It is unnecessary here to discuss the question, whether the two parts

of the picture by Polygnotus were on opposite sides of a wall, as FALKENER supposes, or on opposite sides of a room, or on one side; the latter seems to be intended by PAUSANIAS, who narrates what, on entering into the building, the spectator saw as the subject of the right hand side of the picture, and afterwards describes the other part of it on the left hand side.

LESCOT (PIERRE), was probably born 1510, at Paris (the date depends upon the general assumption that he lived 68 years; which period taken from 1571, a false date for his funeral, gives 1503:) BLONDEL, *Cours*, 8vo., Paris, 1771, vi, 493, says 1518, which compared with his words in iii, 56, is absurd. He was a son of Pierre Lescot or L'Escot (the name is an old form of L'Ecosseais), who was procureur du roi in the cour des aides in that city, and seigneur de Lissy, an estate in Brice-Comte-Robert, near Melun. The son did not possess this property; but from its name some biographers have supposed him to have been a member of a family called D'Alissi, italianized by them as D'Alessi. The son was, by inheritance, seigneur of the fief of La Grange du Martroy near Montreuil and, through his mother Anne Dauvet, also seigneur of the fief of Clagny in the parish of Montreuil near Versailles. He became councillor in parliament, and almoner in ordinary, to the king; 18 December 1554 a canon in the chapter of Notre Dame at Paris; and 1556, or earlier, commendatory abbot of Clermont near Laval: the latter dignity, with the signorial title, caused him to be styled the "abbé de Clagny" as in the print of the Louvre in the *Grand Marot*: and this explains the error of CLARAC, i, 340, who says that François I gave him the abbey of Clagny, an abbey which never existed according to BERTY, who gives a fac-simile of the architect's signature.

His earliest known work was the jubé, with sculpture by J. Goujon, 1541-4, and destroyed 1745 (1750 in CALLET; but, "at the revolution", in AICARD and many others) which was in the church of S. Germain l'Auxerrois at Paris: the design has been proved to be due to Lescot by LABORDE, *Mémoires*, 8vo., Paris, 1852, p. 302: that author corroborates, on this point, SAUVAL, *Histoire*, fol., Paris, 1724, iii, 48, who, ii, 25-32, speaks of Lescot as being the first of the French architects to banish the Gothic style, and to adopt the grand manner of building; this adoption is also named by BLONDEL, *Cours*, iv, preface xli: the curb-roof, a feature afterwards attributed to Mansard, is said to have been introduced by Lescot (most extraordinarily, from Italy) in SAUVAL, iii, 27, who instances the Louvre as the first example of its appearance.

He made a design for rebuilding the palace of Francis I: this is dated 1528 by BRICE, *Nouvelle Description*, 12mo., Paris, 1728, i, 47, and by BLONDEL, *Cours*, iii, 56, but the latter writer must have forgotten this date when (vi, 493) he fixed 1518 for the birth of Lescot; D'ARGENVILLE, *Vie des Arch.*, 8vo., Paris, 1788, i, 299, gives 1510 for that birth, but 1528 for the commencement of the works; and 1528 is also named in PIGANOL, *Nouvelle Descr. de France*, 8vo., Paris, 1718; CALLET, p. 53, states that the works were begun 1534. This design superseded, upon the recommendation of S. Serlio, a project made (? soon after 1528) by that artist, according to LEROY: but in AICARD, *Patria*, 8vo., Paris, 1847, p. 2164-5, it is said that the works were begun 1540; and Serlio did not arrive in France much before the end of the year 1541. The nomination of Lescot as superintendent of the work occurs in letters-patent of Francis I, dated 3 (deuxième, in CALLET, p. 54 and 68) August 1546; who therein speaks of the "plan dont nous avons fait faire les dessins et ordonnances par vous"; this appointment was confirmed 14 April 1547 by Henry II, as appears by letters-patent, speaking of the "nouveau devis et dessins que vous avez fait dresser", which are not dated in the extract from them given by CALLET, p. 54-6 and 70. Lescot held this appointment of "superintendant des bâtiments—du Louvre" from (1550 at a salary of 100 livres per month according to BERTY) 24 July 1559 at a salary of 100 francs per month, according to the text of the letters patent of

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Francis II, as partly printed in CALLET, p. 71, who cites for authorities MSS., No. 3, Suppl. 182, fo. 216-9 and vol. 305, of the *Bibliothèque Royale*: none of them give the title of "architect" to Lescot. The second of the above-mentioned designs (part of the then recent works having been destroyed for it) was probably to have surrounded the old quadrangular court with new uniform buildings on the old foundations, or else to have created a larger court on the site adopted 1624 by Le Mercier for the plan of his extension of the building. The portion executed under Lescot is still called "le vieux Louvre": it extends from the pavillon de l'Horloge or des Cariatides (not included), in the centre of the west side, to the south-western angle of the present court, (the doorway to the salle de la tribune des Cariatides, often named the salle des antiques, is dated 1548), and returned eastward to the pavillon du pont des Arts on the southern side. It exhibits a Corinthian Order under a Composite one, carrying an attic, which is decorated with sculptures attributed to Goujon, who probably executed only the work of the lower stories; the bassi-rilievi in the pediment are certainly by the Florentine Paolo Ponzio Trebati, who probably was entrusted with the direction of the decoration and the attic story. In the completion of the palace a third story is used instead of the attic, which, however, has been respectfully retained along the western façade. According to SAUVAL, iii, 16, all the sculpture was done under Lescot's superintendence, but by the "conduite et dessins" of Jacques Sarrazin who, really, worked under Le Mercier.

The only remaining portions of the original work are stated in AICARD to be the salle des Cariatides and the escalier de Henri II; this publication adds, that the wainscoting (*boiseries*) and ceiling, of the cabinet of that sovereign, which had been recently placed in the *bâtiment de la colonnade*, give an idea of the taste and luxury of the decoration of apartments at Lescot's period of direction. Besides the great plates given in BLONDEL, *Arch. Franç.*, fol., Paris, 1752, iv, pl. 17-18, there are illustrations in BLONDEL, *Cours*, iii, 177, pl. 36, of the central window on the first floor; and 194, pl. 40, of a niche on the ground floor; and pl. 3 of MAROT, *L'Arch. Franç.*, fol., Paris, n. d. The details of the first floor are given in the MONITEUR DES ARCHITECTES, fol., Paris, 1854, xxii, pl. 253. The street fronts were designed by Lescot, with great simplicity and absence of decoration, conformable to the character of 'château du Louvre,' by which denomination this place was known in the titles to many estates. He was succeeded in this work by Baptiste Androuet Du Cerceau.

The fontaine (des Nymphes afterwards of S. Innocent but properly) des SS. Innocents, attached to the church so called, was decorated by Goujon: it was constructed (1550 as in CORROZET, *Les Antiquitez, etc., de la cité de Paris*, 12mo., Paris, 1577), with one bay in the rue aux Fers, and two similar bays in the rue S. Denis, from a design by Lescot, according to PIGANOL, *Nouvelle Descr. de France*, 8vo., Paris, 1718, who is trusted for that fact by BERTY; but by De l'Orme and Goujon according to CLARAC, i, 649. It was restored 1708 according to BRICE, i, 491, who gives an illustration of it; but 1705 is the date given for that repair, and 1788 for the formation of the place des Innocents, in DUVAL, *Les Fontaines de Paris*, fol., Paris, 1812, who shows the original condition in two plates, probably copied from those in BLONDEL, *Arch. Franç.*, iii, 7. A plan and elevation of its alteration into a square block in 1788 (showing the omission of the balustrades), are given in DUVAL, p. 37, with a perspective view; the bassi-rilievi between the pedestals of the pilasters were removed 1810 to the hôtel de la préfecture, for safety: and the original character has been still more altered in a recent reconstruction upon its present new site.

It is not clearly known whether the plans of the hôtel Carnavalet in Paris, are to be attributed to Lescot, or to De l'Orme (as in SAUVAL, iii, 12, who calls the *portail* alone the work of Lescot and Goujon), or to one of the family of Du

Cerceau, or to Bullant; the sculptured decoration of the doorway is always assumed to show the hand of Goujon: and as the name of this artist, who was regarded in his lifetime as an architect, is associated with the three works to which that of Lescot is attached, there is reasonable doubt whether Lescot may not have been merely a clerical supervisor like others before him. A receipt dated 1 April 1560 by Goujon, mentions Lescot as "ayant la charge et superintendance des bastimens que ledict sieur roy fait de present faire et construire en son chasteau du Louvre." ANDROUET DU CERCEAU, *Les plus excellents bastimens*, fol., Paris, 1576, i, 3a, speaks of the Louvre as "sous l'ordonnance et conduite du seigneur de Clagny;" and BINET, in *Vie de P. de Ronsard*, explaining a passage in RONSARD, *Œuvres*, 12mo., Paris, 1609, x, 137, mentions the "sieur de Clagny à qui le roi Henry avoit commis la conduite de l'architecture de ses chasteaux." In the translation by J. MARTIN of VITRUVIUS, fol., Paris, 1547, there is an introductory epistle by Goujon, which mentions Lescot with De l'Orme as qualified to have been the translators of that author; and the verses by RONSARD specify Lescot's early devotion to painting, mathematics, and architecture. Some buildings at Fontainebleau are mentioned by FELIBIEN, *Hist. de Paris*, fol., Paris, 1725, p. 1021, as the work of Lescot, but so vaguely as not to be open to identification. The château de Madrid (probably by P. Gadyr) has been erroneously ascribed to Lescot. He died at Paris 10 September 1578 (not 1571), and was buried on the second day, in the chapel of SS. Ferréol and Ferracion, the second eastward from the porte rouge in the cathedral.

This memoir is chiefly an abstract of the corresponding portions in BERTY, *Les grands Architectes Français*, 8vo., Paris, 1860, whose researches supersede the earlier incomplete and inaccurate notices; but reference may be made to DONALDSON, *Brief account of the palaces of the Louvre and Tuilleries*, read 6 March 1854 at the Royal Institute of British Architects, *Sessional papers*, 1853-54, p. 77-90. CALLET, *Notice Historique*, 8vo., Paris, 1843; and CLARAC, *Musée*, etc., du Louvre, 8vo., Paris, 1841, are amongst the least deserving of confidence, and their defects have suggested the necessity of thus entering so minutely into the various works attributed to Lescot.

LESINA, or LESSINA (the ancient Pharia). A city on the south-west coast of the island of the same name in the Adriatic, situated off Dalmatia, and twenty-four miles south of Spalato. The town is defended by two forts, one of which by its name 'lo spagnuolo' shows that it owes its existence to the alliance of the emperor Charles V with the Venetians against the Turks; it was probably designed by the elder Sanmichele and executed about 1536-56 by his nephew Giovanni Girolamo Sanmichele. The town is full of fine specimens of Venetian architecture, and the central piazza is unusually handsome for so small a city.

The cathedral, dedicated to S. Stephen, is a plain structure of modern Italian architecture with two campanili. The other buildings consist of the seminary; the large barracks; and the loggia on the quay, for meetings of the municipal council, attributed to M. Sanmichele (1484-1559), who probably designed the vaulted building, converted into a storehouse, originally used by the Venetians as a naval arsenal; STRANGFORD, *Eastern Shores of the Adriatic*, 8vo., London, 1864, p. 217, who also notices a semicircular resting-place outside the town.

LESPINE, LÉPINE, or L'ÉPINE, Espine, or Épine (JEAN DE), born in the sixteenth century at Angers, was a pupil of P. de l'Orme. He designed the château du Verger; the hôtel d'Anjou; the central tower of the church of S. Maurice, finished 1540 for François de Châteaubriant, dean of the cathedral; and the tour de la Trinité, etc.: he died at Angers, and was buried in the church of the Carmelites in that city; BODIN, *Recherches — l'Anjou*, 2nd edit., 8vo., Saumur, 1845-6, ii, 196, 346, 581. COMITÉ HISTORIQUE DES ARTS, etc., *Bulletins*, 8vo., Paris, 1842-43, ii, 59.

LESPINE (. . .), see DELESPINE, (. . .).

LESSEE AND LESSOR, see LEASE.

LESTRADE (. . . DE) was a member 1768 of the academy of architecture at Paris, and died in 1790.

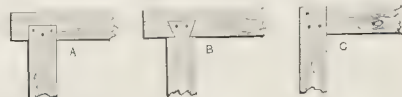
LETAROUILLY, or as written by the family LE TAROUILLY (PAUL MARIE), born 8 October 1795 at Coutances in France, studied 1814 at Paris under Dinet the course of mathematics, necessary for admission into the école polytechnique, because his relative the general Treussart had directed his attention to military engineering; but at the peace he obtained 1816 through the baron Mounier admission to the atelier of C. Percier. In that year he entered the école des beaux arts, and four years later was allowed to compete for its prizes. In order to finish his education he studied the reconstruction of the théâtre de l'Odéon under Baraguay d'Hilliers: and in the autumn of 1821 went to Italy. On his return 1824 to Paris he became *inspecteur des travaux* of the ministry of finances in the rue de Rivoli, of the place de la Concorde, and of the new buildings at the observatoire, successively. As *architecte-en-chef* of the collège royal de France, a title which he retained during life, he added 1831-42 to the buildings (erected 1774 by Chalgrin) two pavilions connected by a courtyard with an internal portico: the style of his predecessor was duly preserved in the pavilions, one of which was a prolongation of the façade on the place Cambrai; but the court on to the rue S. Jacques, with its portico and three arcades opening into a smaller court which separates it from the old buildings, shows the personal taste of Letarouilly, whose idea of decoration by statues and bronze tablets has not yet been completed in this portion. His work, costing 1,198,000 francs, is shown in GOURLIER, etc., *Choix d'édifices*, fol., Paris, 1837-44, iii, 329-32; the section of its roof in MONITEUR DES ARCHITECTES, 4to., Paris, viii, pl. 96.

He revisited Rome 1831-2, and again 1844-5, for the sake of his splendid publication, *Édifices de Rome moderne, ou Recueil des palais, maisons, églises, couvents, et autres monuments publics et particuliers les plus remarquables de la ville de Rome*, which was published during the years 1825-1860, in parts, comprising 355 plates, and the *plan of Rome* which he produced in 1841: the descriptive text in 770 quarto pages has been so extensively useful in the preparation of articles in this Dictionary that the obligation must be acknowledged. He collected three volumes of manuscripts and drawings by the old Italian architects; and the materials, (some of the plates were engraved) for another work upon the basilica of S. Peter and the palace of the Vatican. Though he was honored with the cross of the Legion of Honour (1853-4), vexation, at the piracy of his magnificent work by a copy lithographed at Liège, was considered by his friends to be the cause of his death, which occurred 25 October 1855, at Paris. LANCE, *Notice—sur P. M. le Tarouilly*, 8vo., Paris, 1855.

LETELIER (GUILLAUME), see TELIER (G. LE).

LETHICIUM. A liquid so called about 1866 by its manufacturers, Messrs. Naeniare and Co., and recommended by them for its usefulness in removing old paint clean to the wood in twenty minutes, thus saving the time and trouble of burning it off.

LET-IN. When a sinking or chase has been made in one piece of wood and another joined thereto by fitting it into the sinking, it is said to be "let-in", as A. The best and soundest



work is "let-in dovetailed", as B; if one piece is cut deep enough for both principal surfaces to be in the same plane, it is said to be "let-in flush." A similar junction at the end of the pieces is said to be "halved on", as C. The junctions of the treads and risers with the strings of a staircase are said to

be "housed in"; HOUSING; which term is expressed in the north by that of "chime", as "nosings chimed at both ends into stringings." A. A.

LETON and LETTEN. Old spellings of LATTEN.

LETTER. The application of letters in architecture may be divided into two branches, according to their execution on a surface, or in the round, *i. e.* free like a baluster. The enrichment of a plain face, in highly worked material, suggested by inscriptions on Assyrian sculptures, is a valuable precedent to those who consider that all large surfaces of wall require that effect of continuous variety which is exhibited by rubble work, by rough-cast, and by brickwork. The Egyptian buildings offer examples of this effect which deserve especial study from those who consider that the manner of executing ornaments should be influenced by the position in which the work is put: even upon sandstone the hieroglyphs were worked in rilievo as well as in intaglio (relief being usually adopted for figure subjects) until the time of Ramses II, in whose reign intaglio was more frequently employed and afterwards became prevalent. The ground of incised hieroglyphs is usually parallel with the face of the work; but on a wall behind a range of thick columns in the second court of the temple erected by Ramses III at Medenhet Haboo, and generally throughout that building, the surface of the hieroglyphs was made in a plane so inclined to that of the wall as to give the greatest depth at the foot of them: this system may appear to be the reverse of the right process; but on consideration it will be evident that the intention (quite fulfilled) must have been to render the sign darker than the wall; the application of the method in a northern climate may require experiment, as it cannot be suitable to all circumstances. The introduction of unpanelled lettering on large surfaces was frequent about 1800 in the designs of French architects, who, like their predecessors, were very successful in their choice of shapes for the letters which they used for internal as well as for external decoration. Such selection has been much neglected of late years by English architects; the loss which ornament has sustained in this respect may be estimated by those Englishmen who, looking at the Royal Exchange and the church of St. Martin in the Fields, in London, and a few other edifices in the country, can appreciate this enrichment of their friezes, which though cheap in labour usually entails considerable thought on the part of the architect. It is possible that the employment of inscribed facias, instead of signs, for shops, may have caused architects lately not to avail themselves of hints, as to the rich effect of inscription, which are afforded by the borders of the sepulchral memorials executed in mediæval times, and by the bands of writing in the structures of the Mahometans, who seem to think the Cufic character the most elegant for their monumental literature. The absence of points, however, causes many words of such oriental inscriptions to be now as vague as some of the few examples which were executed with gothic minuscules in the Latin, French, or German, languages, in the strings of edifices. The Roman inscriptions which happened to be executed in relief, are supposed to have been destroyed for the sake of the metal of which the letters are presumed to have been made; in some cases the holes, cut in the stone to receive the dogs at the back of the letters, have served as hints for the restoration of the words.

Connected letters, careless drawing of Roman shapes mixed with Greek forms of letters, and rough execution, characterise the few words inscribed during 568-772 by the Lombards. It is not possible to mistake the style of these inscriptions for that of the equally scarce productions of the fifth and sixth centuries at Ravenna and at Rome, which differed little in their letters from those of classic times: and it is quite as impossible to mistake it for that of other Latin inscriptions of so late a period as the first half of the twelfth century. At that latest period the semi-gothic or round-shaped letter began, though very slowly, to manifest itself in Italy, according to CORDERO, *Dell' Italiana Architettura*, 8vo., Brescia, 1829, pp. 175, 178,

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and 251, who uses the lettering of inscriptions as one of the indications of the date of buildings, and observes that the introduction of the semi-Gothic character, which is improperly called Lombardic, was equally late in Normandy and the rest of France where, in the eleventh century, the letters were as carefully drawn and tolerably neatly executed as in Italy.

In Germany, the Roman majuscule letters, with some contractions and connected letters, were employed at the end of the tenth century; in the eleventh and twelfth they were mixed with the round-shaped letters (*römische und neugothische majuskel*), and the use of *b* for *B* is characteristic of the year 1200; the Lombardic style was supreme 1250-1350; from the end of the fourteenth century (at least from 1360) the Gothic, or black, minuscule was as extensively employed; the present forms of German letters date from the commencement of the sixteenth century: a series of examples is given in OTTE, *Handbuch der kirchlichen Kunst-archäologie*, 8vo., Leipsic, 1854, p. 239. In Spain, the black letter minuscule appears at least as late as 1494 at the Alhambra. MONOGRAM.

In England the Lombardic character or, properly, the Gothic majuscule, was employed 1100-1350; the black letter or properly, the Gothic minuscule, prevailed 1325-1530; the Roman majuscule regained favour about 1530, and was soon generally employed; but black letter was used until the beginning of the seventeenth century. NUMERAL.



An idea, perhaps more curious than useful, but certainly unique, for letters appropriate to sepulchral inscriptions, is preserved in POTIER et WILLEMIN, *Monuments Français inédits*, fol., Paris, 1839, ii, 275. *Illustrations*, 1867, pt. 1.

The application of ornamented letters as cyphers has been so general, from the commencement of the renaissance to the present day, that to name even a selection of the numerous publications upon them would occupy too much space in this article; yet reference may be made to *Annales de Philosophie Chrétienne*, 8vo., Paris, 1839, new series, xviii, 434-44.

An early instance of the employment of letters in the round occurs in the parapet or balustrade at the western end of the Ste. Chapelle at Paris, where the period of the new work is shown by a crowned *κ* (Karolus VII, 1422-61) supported by angels between fleurs-de-lis in quatrefoils: the balustrade of the oratory, added 1461-83 by Louis XI to that building, has a crowned *L* among fleurs-de-lis: and the balustrade of part of the château at Blois exhibits a crowned *F* for Francis I. Such an application of letters became common at the end of the fifteenth century, and in the beginning of the next age, when whole words were thus set forth; such occur at the house of Jacques Cœur at Bourges, at the château of Jo-selin in Bretagne, and at the choir of the church in Ferté-Bernard near Mans. The balustrade with the word *esperance* on the petit hôtel de Bourbon, is mentioned by SAUVAL, *Histoire de Paris*, fol., Paris, 1724, ii, 209, 210; iii, 25. Besides examples at Castle Ashby, Hardwicke-hall, Longleat, and many other places in England, there may still exist, perhaps, a pierced parapet made of letters upon a house at Temple Newsome near Leeds.

The material with which letters, inscribed on marble and stone, are coloured, is usually varnish with a black or red pigment: but the celerity with which this substance disappears under exposure to weather has caused inquiries for one more resistant. The process, of covering the polished stone or marble with a coat of size and whitening, and the blacking the letters to be worked in with a brush (the sized surface being of necessity somewhat blacked at the same time, is easily removed with a tool of soft brass without injury to the letters or to the stone), was rewarded with a silver medal to C. H. Page of the United States, and is described in the SOCIETY OF ARTS, *Trans-*

actions, 8vo., London, 1839, lii, part 2, p. 239. Sealing-wax dissolved in spirits of wine is recommended in the *BUILDER Journal*, 1860, xviii, 613; but, so long as letters are merely but little else than scratches on the marble it may be useless to suggest any remedy. A modern usage (about 1864) for inscriptions in cemetery memorials is to incise the letter, forming it as a key, into which is driven a soft metal letter filling up the vacancy, and the whole polished off to a level face. They are presumed to last as long as the stone or marble.

LETTERN, see LECTERN.

LETTER WOOD or SNAKE WOOD, see BROSIMUM, and PIRATINERA.

LETURRIONDO (ANDREA), designed 1542 the parish church of Sta. Marina de Oxirondo, in the province of Vergara, in Spain, and commenced it with the capilla mayor. He was succeeded 1552 by Estiburu. 66.

LET WORK. When a master builder agrees with a tradesman, or a workman for the execution of a portion of his contract, it is said to be "let work." In some instances, as smith's, plumber's, etc., work, the tradesman finds iron, lead, etc., as well as labour; in this case the letting is called "all materials"; but in general the master builder finds the bulk of the materials; thus, if he find bricks only for brickwork, the letting is said to be "labour and mortar", if he find all materials, it is then called "labour only." In carpenter's work, in like manner, if the master builder find the stuff only the phrase is "labour and nails"; if he find all materials "labour only." Sometimes workmen make agreements to perform the labour to doors, sashes, etc., at so much each, this is called "piece work." Sometimes they will employ another on some portion of the work consigned to them, this is called "sub-letting work." A. A.

LEUCA, in Southern Italy, see ALESSANO.

LEUCA. The old term for LEAGUE.

LEUCAS, in one of the Ionian islands, near the coast of Acarnania; see AMAXICHI. The ancient enclosure is almost entirely traceable. Opposite the middle of the city are the remains of the bridge and causeway which have crossed the Lagoon, the great squared blocks of the latter are still seen above the shallow water. PORTLOCK, *Appearance of an Arched Arrangement of the Stones in the Cyclopean Walls of the Ancient City of Leucate, Island of Santa Maura*, in Corps Papers of Royal Engineers, 8vo., London, 1849-50, i, 21.

LEUCOMB. A term which occurs in old contracts, and is supposed to mean a dormer window. A. W. M.

It is also spelt 'lucombe', and is probably a corruption of 'luarne', as applied to projecting flour loops. G. A.

LEUZARCHES (ROBERT DE), see LUZARCHES (R. DE).

LEVANTI (ANTONIO), practised about 1611 at Bologna, where he designed the church of the Madonna della Grada or del Cimitero. 105.

LE VAU (LOUIS), see VAU or VEAU (LOUIS LE).

LEVÉ (PIERRE). He probably studied under Dulin, and practised at Paris, where he built many large houses, among which were 1707 the hôtel d'Antin now called Richelieu, for François Mauricet de la Cour; and about 1710 a house formerly called hôtel des Chiens, rue de Richelieu, near the Boulevards; which latter is given in BLONDEL, *Arch. Franç.*, fol., Paris, 1754, b. v, iii, 93, when the comte de Mailly resided there. He died 1712; BRICE, *Descr. de Paris*, 12mo., Paris, 1725, i, 363. 5.

LEVECEL or LEVESSEL. An old term for a pent-house roof, or a projecting roof over an opening. CHAUCER, (l. 4059), uses the words in the Reve's, and also the Parson's, tale, as, "behind the mille under a levesell" in the former tale. GALFRIDUS, *Promptorium Parvulorum*, 1499, edited by A. Way for the CAMDEN SOCIETY, 4to., London, 1843-53, defines Levecel, as "be-forne a wyndowe or other place; Umbraculum." A writer in the NOTES and QUERIES *Journal*, 1867, 3rd. ser., xii, p. 402, suggests that it is simply an awning put up pent-wise; a leaf-cell. 17.

LEVEILLÉ (. . .), designed 1822 the tribunal, caserne de gendarmerie, et prison communale at Barcelonnette (Basses Alpes), given in GOURLIER, etc., *Choix d'édifices*, fol., Paris, 1837-44, ii, pl. 133.

LEVEL (Ital. *nicello*, *livello*; Fr. *niveau*; Germ. *richt-schnur*). As applied to a line, this word means any which lies at right angles to one drawn to the centre of the earth, or to a plumb line; or any line which is parallel to the horizon. As applied to a plane, the term 'level' signifies any in which all lines drawn in any direction are level lines as before defined. The surface of a fluid is sometimes called level, but is in truth part of the surface of a spheroid, the curvature being eight inches to a mile. Fluids, however, are much used in levelling, as the curvature is so small as to be imperceptible in short lengths, and even if it were not so, those parts equally distant from the centre,

as A and B from C, are A

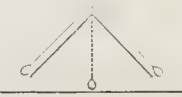
level, or at right angles

to the radius of the earth at that place. LEVELLING. A. A.

LEVEL. An instrument used in LEVELLING. There are several sorts. The "spirit" level consists of a glass tube which is nearly filled with some spirit and hermetically sealed, so that the bubble of air will shew by marks, placed equidistant from the centre, that the tube is level. It is sometimes let into a block of wood, and is sometimes fixed on the back of a long straight edge; while for superior work it is mounted on a tripod stand and fitted with a telescope, cross hair sight, parallel plates, etc. The chief varieties are the "long" level, the telescope of which is longer than the others; and the "dumpy" level, or one with a spirit tube of the usual length, but with a short telescope: the last has generally been preferred as most portable and convenient; though some consider the former the best for long sights. The telescope is sometimes secured in its place with screws, which can be regulated so as to make the line passing from the observer's eye to the intersection of the cross hair sight (which is technically called the line of collimation), exactly parallel with that indicated by the bubble. Sometimes the telescope lies on two bearings of the shape of the letter Y, from which it can readily be removed and reversed to prove its correctness: this is technically called a "Y" level. For the sake of greater cheapness, the telescope shews an inverted image. These instruments are figured and described in the publications named, s.v. DRAWING INSTRUMENTS. CHOROBATES; DIOPTRA. An "A" level by Denton, is described in CIVIL ENGINEER, etc., *Journal*, vii, 424.

"The bricklayer's and carpenter's level" consists of a straight rule to which an upright piece is secured at right angles, either by a simple mortice, or by struts; a line is scribed on the upright at right angles to the bottom line, and a weight, generally a metal plumb bob, secured from the top, so as to play freely in a hole cut in the straight rule. When the line by which the weight is suspended coincides with the upright line before described, the rule is level, and that it may be made so, the supports A and B must be firm, and wedged up to the correct height by thicker or thinner pieces of stuff. These levels are made from 6 ft. to 12 ft. in length according to the purpose for which they are required. LEVELLING.

The "joiner's and mason's level" consists of three pieces of wood framed together in the form of an isosceles triangle, the angle at the vertex being a right angle, and having three holes in which a plumb bob may play. This may be used for levelling a flat surface, or the soffit of a door, or for plumbing door jambs, or other similar purpose. A. A.



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LEVEL, HANGING, see HANGING LEVEL.

LEVELLING. The process of measuring and delineating the rise and fall of ground, for the purpose of setting out foundations, ascertaining the proper lines for conducting water, or drainage, the formation of roads, canals, and railroads, or other similar work. Also for investigating whether the courses of a wall, the surfaces of floors, etc., are parallel or not parallel with the horizon. The principle of levelling will only be here entered upon.

In ordinary work, levelling is performed by the "bricklayer's level", which in irregular ground is blocked up by bricks, thin pieces of wood, etc., as shewn in the above woodcut. It is essential to the correctness of the work that the level should be reversed at every operation in case wear or shrinkage should have thrown it "out of the true." Thus, suppose the bricklayer's level (shewn in the cut) to be not quite correct, and the point B thus be made too high, if the level be held the same way forward the second time, the point C will be twice as much too high as B, but if the level be turned end for end and the point A be brought forward, the point D, at an equal distance from B, will be exactly level with the starting point A.



In more accurate work, where an elaborately constructed instrument also called a LEVEL, is used, the observer begins by selecting a BENCH MARK, or some flat surface not likely to be soon altered, as the step of a door; in country work the lower hook of a gate post is often selected. On this the LEVEL STAFF is placed. The observer then goes a certain distance and notes where the cross hair cuts the staff, and books the observation as a "back set" or "back sight": if he has two assistants the second goes forward and selects a place whereon to stand his staff, when the observer simply reverses the instrument and observes the "fore set" or "fore sight": if he has but one assistant, he waits till the latter has gone forward and then takes the "fore set." But whoever acts as the "fore set" man, he remains on the spot simply turning the staff round, which then becomes a back set; the observer then goes forward, again places and adjusts his instrument, and repeats the operation. He enters in his book the "back set" and "fore set" in two columns; the difference between the sums of the numbers in these two columns will be equal to the height or depth of one extremity of the line above or below the other. The same golden rule is as necessary for the leveller as the land-surveyor, "observe, book the dimension, and then observe once more to see all is right"; but another rule is equally important, "always, if possible, place the instrument at an equal distance from both sets."

If A B be a true level line, and the instrument, being at C is out of adjustment and points too high, as to D instead of towards A; then on taking a fore-set E, if at an equal distance from D a height just as much too high would be read at E as at D, and consequently in adding and subtracting one error would compensate the other. But if the fore-set were double the distance from the observer as at F, then the error at that spot would be double that at D, and the measure would be decidedly wrong.

If, as is sometimes the case, a long sight across inaccessible ground has to be taken, allowance must be made for the curvature of the earth; for this tables are supplied in almost every scientific work.

Levels should be frequently proved. This is done by taking three or more sets, and returning to the starting point. The adjustment of spirit levels varies according to their construction. As a general rule, the tube should be turned four dif-

ferent ways, being first set as level as possible by the legs of the tripod. After that, a few touches of the screws of the parallel plates will suffice to place it correctly level. In all important cases of levelling a line should first be run as a *trial level*. The observer should then take another set of levels back to the spot from which he first started as a *check level*. Of course the distance from set to set must be taken at the time by the chain. But the off-sets, and other filling in work, are generally done by another surveyor with the theodolite.

A. A.

BRUFF, *Engineering Fieldwork*, 8vo., Lond., 1840; SIMMS, *Principles and practice of L.*, 8vo., London, 1846; CASTLE, *Field Notes on parish and railway Surveying and L.*, 8vo., London, 1847, 2nd edit.

A useful "table of levels" furnished by E. W. Tarn to the *BUILDER Journal*, 1858, xvi, 534, was compiled from the formula $F = D \tan. A$, where F is the fall of a piece of ground for the horizontal distance D, and A is the inclination of the ground to the horizon. By reference to this table the amount of fall in any length can be seen for any angle of inclination.

| Value of A. | Fall of ground for each value of A. |
|-------------|-------------------------------------|
| 1 deg. ... | 17.5 in 1000 or about 1 in 57. |
| 2 " ... | 34.9 " " 1 in 29. |
| 3 " ... | 52.4 " " 1 in 19. |
| 4 " ... | 69.9 " " 1 in 14. |
| 5 " ... | 87.5 " " 1 in 11. |
| 10 " ... | 176 " " 1 in 6. |
| 15 " ... | 268 " " 1 in 3. |
| 20 " ... | 364 " " 1 in 2. |
| 25 " ... | 466 " " 1 in 2. |
| 32 " ... | 577 " " 10 in 17. |
| 35 " ... | 700 " " 7 in 10. |
| 40 " ... | 839 " " 21 in 25. |
| 45 " ... | 1000 " " 1 in 1. |

GRADIENT; INCLINE.

A simple method of levelling without a mechanical instrument is adopted in some parts of India where such facilities are not easily obtainable; for drainage or other such purposes, it is obviously a most practical method. At any point of the undulating ground in the direct line of the section required, a small trench is dug or banked up and puddled with clay (unless the soil should itself be loamy) and is filled with a pail or so of water. Two sticks are then affixed, one at each end of a small float (a miniature boat with two masts) of exactly equal height with level tops. At the farthest sighting distance from this trench erect the staff, and from the opposite side of the trench the sight is taken along the tops of the two sticks and a motion made to the assistant when and where to fix the register. The operation is repeated throughout the line to be levelled.

J. T.

In Italy, the level generally used is rude and old-fashioned, but simple and perfectly efficacious. A glass tube turned up at each end is fixed to a stem with legs; wine or other colored liquid is poured into the tube, and however much the instrument may be placed out of level, the liquid of course keeps at the same level in the turned up ends, and the sight is so taken.

S. S.

LEVEL STAFF. An upright staff five feet long, graduated to feet and decimals of a foot, the numbers indicating the feet being very plainly written. The staff contains two thinner leaves called vanes, so contrived that they may be drawn out and thus elongate the staff to shew a height of fourteen feet. It is held by an assistant, so that it may be seen by the observer who reads by the telescope the elevation of the line of collimation (described in LEVELLING,) from the ground.

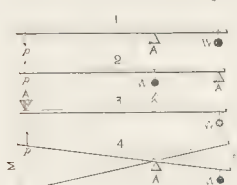
A. A.

LEVER. A term explained in SURTEES SOCIETY, *Finchale Priory*, 8vo., Newcastle, 1837, *Gloss.*, as "one of the chief supporters of the roof timber of a house, being itself not a prop but a portion of the framework", quoting MINSHEU, *Dict.*, s. v. Leaver. "It seems to be synonymous with 'syles,' a Northern appellation for a common rafter in a roof.

LEVER (It. *lieva*; Sp. *alzaprima*; Fr. *levier*, *pince* if of iron; Ger. *hebel*). An instrument for moving heavy objects.

T

It is the first and simplest of the mechanical powers, being an inflexible bar or beam supported on some immovable substance called a fulcrum, as A, in the accompanying figures, and the power being employed at one extremity the weight is moved at the other, or at a point between them. Levers are of three sorts or "orders." The first is where the fulcrum lies between (p) the power applied, and (w) the weight or object to be moved; an ordinary crow-bar, or a handspike, or the beam of a pair of scales, are common instances. The second is where the weight



to be moved is between the power and the fulcrum, as a door, the oar of a boat, a bread-cutter, etc. The third is where the power is between the weight and the fulcrum, as shears and tongs. In all instances the effect is as the distance from the fulcrum into the power either applied or transmitted. Thus, if the distance from p to the fulcrum

be 4 ft. (fig. 1), and that of w be 2 ft., then $4p=2w$ or $p=\frac{2}{4}w$ or $\frac{1}{2}w$. While (fig. 2) $6p=2w$, and $p=\frac{2}{6}w$.

Another method of calculating the power of levers, as also of any mechanical power, is derived from the fact that the gain of power is directly proportional to loss of motion, and the contrary. Thus, if m, in fig. 4, represent the motion of p, and m that of w, then $m w = m p$, and $w = \frac{m p}{m}$. This is simply an illustration

of the former problem. The two triangles having one angle (the opposite) equal, and being isosceles are similar, and the homologous sides are proportionals. The same rules apply to bent levers, as a claw hammer for drawing nails. Friction is not taken into account, nor the extra weight of the longer limb, the lever being supposed to be perfectly rigid and imponderable, but in practice the weight of the lever must be taken into account. TATE, *Exercises on Mechanics*, 12mo., Lond., 1817, 2nd edit., pp. 55-62.

1. LEVER, BALL, for a cistern, see BALL LEVER.

LEVER-BOARDING. An apparatus formed of boards placed in an opening and hung on pivots at each end, being so contrived that by moving a connecting rod they may all be opened together to admit a larger quantity of light and air, or be closed so as to lap over one another and admit less. It is very much used where air drying operations are carried on, as at leather works, etc. Strictly speaking, the lever-board differs from the Venetian blind, as short metal levers are sometimes attached to the boards to give greater purchase in opening or shutting them, which is done at one movement; while the laths of the blind depend only on their own width for leverage. They both differ from LOUVRE- or LUFFER-BOARD-

ING, which are always fixed. 1.

LEVERTON (THOMAS), born in 1743 at Woodford in Essex, was the son of a builder at that place, under whom he worked and acquired a knowledge of the principles of construction. He was subsequently enabled, by influential patrons, among whom was Mr. Kendall, a banker, to perfect himself in architecture, and was extensively employed in private works, erecting many town and country mansions, and several houses in Bedford square, one of which, No. 13, he completed for himself, and continued to reside in it until his death.

He exhibited at the Royal Academy of Arts in London, 1771 design of Woodford-hall for William Hunt, then building; 1772 a gentleman's villa; 1773 elevation of a villa to be built in Ireland; and garden front of a villa building in Kent; 1774 a gentleman's villa in Hertfordshire, and a smaller villa in Essex; 1775 stable and offices in Essex, and villa in Hertfordshire; 1776 front of Boyles then building in Essex; 1777

chapel then building, and villa to be erected in Essex; 1778 gentleman's seat then building in Hertfordshire (i. e., Watton Wood-hall, for Paul Benfield, esq., or Sir Thomas Rumbold, since occupied by Abel Smith, esq.; RICHARDSON, *Vitr. Brit.*, fol., London, 1802-8, i, pl. 28-30), and town house of a person of distinction then building in London; 1780 a gentleman's seat building in Kent; 1781 arch in a park at Parlington, Yorkshire, then building (for Sir Thomas Gascoigne); 1782 lodges designed for a gentleman in Hertfordshire; 1783 elevation, plan, and bird's-eye view of design for penitentiary houses, premium received; 1784 two designs for villas; 1785 south front of design for 600 male and 300 female convicts, and front to the river of a villa then building; 1787 the Phoenix fire office, Charing-cross; 1792 Riddlesworth-hall, Norfolk, then building (for — Bevan, esq.), and Town-hill, Hampshire, then building; 1794 elevation of engine-house (in Cockspur-street, on part of site of Trafalgar-square), building at Charing-cross for the Phoenix fire company (shewn in MALTON, *London*, etc., fol., London, 1792, p. 32, pl. 20); 1796 banking-house erecting in Lombard-street (for Messrs. Roberts and Curtis, since rebuilt); 1797 design for finishing the king's theatre, Haymarket; 1801 west front of a design for a church; 1803 elevation of a sugar-house building at New York, North America; design for Grocer's-hall (in the Poultry, the first stone was laid 30 August 1798, was completed 21 July 1802, and somewhat altered by J. Gwilt, RICHARDSON, ii, pl. 6-9); view of Scampston-house, Yorkshire, building for W. T. St. Quintin, esq.; and marine villa erecting for Rev. Dr. Singe at Lisle, county of Cork (RICHARDSON, ii, pl. 50-5).

Among his other works, perhaps not included in the above list, are, a large house in the country, for Nathaniel Middleton, esq., wherein he is said to have forgotten the staircase; another, with a dome and portico, near Bromley in Kent; a house in S. James's-place, facing the Green-park, London, for Sir John Lubbock, banker; and another in Lincoln's-inn-fields for Henry Kendall, esq.; with several large warehouses for sugar-bakers at the east end of that city. He was ultimately appointed with his pupil, Thomas Chawner, surveyor to the office of works under colonel Stephenson, and submitted at the same time as John Nash, a plan for laying out the plot subsequently appropriated to the Regent's-park (according to Mr. Nash's project approved by George IV.), it is shown in the *First Report* of the Commissioners of Woods, Forests, etc., fol., 1812. He was also surveyor to the Phoenix fire insurance company; and to the theatres royal in London.

Having largely employed John Flaxman, when a young man, to model for him, the latter executed a bust of Leverton's son, which is now in the Flaxman collection at the London University. J. Bonomi entered his office as drawing assistant when he first came to England from Italy; and H. E. Kendall was a pupil. Leverton died 23 September 1824 in the 81st year of his age, and was buried in Waltham abbey church, where a monument (executed by Joseph Kendrick, sculptor) for which he left the sum of £300, was erected to his memory. He bequeathed about £50,000 to his relations and friends, and £12,000 in charity and valuable donations, as quoted in the *GENTLEMAN'S MAGAZINE*, 1824, xciv, pl. 2, p. 469. He was one of the justices of the peace for Surrey, Kent, Middlesex, and Westminster. William LEVERTON, his nephew, was a builder. T. L. D.

LEVESEL, see LEVECEL.

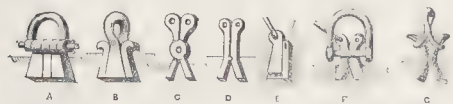
LEVINGSTON (JOHN DE) "magister fabricæ" of the bridge of Tay at Perth, 1425 received £10:14:8. ROBERT DE LEVINGSTON is named as the "magister fabricæ" of the king's palace at Linlithgow, in 1435-37; BANNATYNE CLUB, *Account of Great Chamberlain*, 4to., Edinburgh, 1817, iii, 166: 324, 369, 370.

LEWIS or LEWISSON (It. *ulivella*; Fr. *louve*, supposed from *levis*, raise, as *pont levis*, a drawbridge). An instrument by which large stones may be hoisted, and lowered, without

slings that would be in the way of other stones against which it is proposed to place them. A tradition exists that the form at present in use was revived by a workman in the reign of Louis XIV (1643-1715) of France, from whom it derives its name; it is, however, shown in the edition of VITRUVIUS by BARBARO, fol., Venice, 1567, p. 446, where it is called *ganze*; and in RAMELLI, *Le Diverse Machine*, fol., Paris, 1588, fig. 169, 172, 175, but without being designated in the accompanying description in Italian and French. *BUILDER Journal*, 1862, xx, 67, 96, 160, 278.

This instrument is composed of three pieces of iron (fig. A) a bolt, and a semicircular ring, all moveable. A hole, of dovetail section, being cut into the stone, the two pieces right and left are first inserted, then the middle piece which has parallel sides, then the ring is added, and the whole is kept in place by passing the bolt through, which has a head at one end and is keyed at the other to prevent it slipping out. The dovetail form prevents the iron from coming out of the stone, and the whole is hoisted by the ring.

A. A.
The stones of the pyramids have holes in them 8 ins. by 4 ins., evidently made for the insertion of some instrument used in raising them. The lewis is supposed to have been known to the Romans, and is discussed *s. v.* Porfex. PIRANESI, *Antichità Romane*, fol., Rome, 1756, iii, pl. 53-4; and NEWTON, *Vitruvius*, fol., London, 1771-92, ii, book x, give representations of lewis (as figs. B and C). VASARI, *Lives*, 8vo., Lond., 1850, i, 424, notices that Brunellesco, while studying the antiquities at Rome about 1406, observed a hole in all the larger stones for "that iron that we call *la ulivella*, the use of which he restored and afterwards put in practice."



Some of the larger stones used during the later years of the mediæval period have holes in the upper beds. GIBSON, *On a machine called the Lewis*, in the *ARCHÆOLOGIA*, 1792, x, 123-7, gives the section of a hole at the top of a keystone, which weighed 1½ ton, to the windows at Whitby abbey, showing a very short middle key, if any was used, in the lewis. Essex notices in GOUGH, *Bibl. Top. Brit.*, 4to., Lond., 1790, iii, app. 195, the use at Croyland abbey of the mediæval form later than the reign of Henry VIII. In the fac-simile of the sketch book of Wilars de Honecourt, edited by LASSUS, and translated by WILLIS, 4to., London, 1859, p. 163, a form of lewis (fig. c) is described, which "is extremely simple and hitherto unknown"; this is supposed to be of the thirteenth century: it is figured as in use, in the *BUILDER Journal*, 1862, xx, 278. A crampoon is shown with other instruments, on the brass of H. LIBERGIER, (died 1263). TURNER, *Dom. Arch.*, 8vo., London, 1851, xxxii, states that the lewis in early accounts is called a 'lowes' and was well known in the thirteenth century"; in support of this statement, the SURTEES SOCIETY, *Fabric Rolls of York Cath.*, 8vo., Durham, 1859, pp. 12, 27 and 100, has 1371 "In xviii lewors emptis pro fabrica"; 1404 "In cordis emptis pro louers 10d."; and 1525 "pro viii les loveres 4s.", which may refer to the instrument in question, but not to a louvre or lantern as suggested in the glossary at the end of the work.

VIRLOYS, *Dict.*, 4to., Paris, 1770, pl. 41, gives, fig. 14 a lewis having a centre wedge or *loue*, acting against side bars or *louvetaux* (B); fig. 23 a crampoon or *loue à tenailles*; and fig. 24 the lewis, (A), as "used in former times at Rome." A machine similar to B appears to have been used in lifting the blocks of 4 tons each forming (1805-16) the breakwater or pier to the Howth harbour near Dublin. A lewis with straight upper shanks (fig. n) is shown, as of modern use, in BRENNMANN, *Allgemeine Bau-Constructions-Lehre*, 4to., Stuttgart, 1849, pl. 8:

and another with an oval ring at top to confine the shanks, called Russell's "speedy lewis", in *BUILDER Journal*, 1847, v, 102, 127, 138. HANN and HOSKING, *Theory, etc., of Bridges*, 8vo., London, 1843, i, illustrate the use of the lewis (fig. E) employed "in the economical method of building the foundations" of a pier at Inverness by Telford; it is also shown in *CIVIL ENGINEER*, etc., *Journal*, 1840, iii, 29-30. Sutcliffe's "general lewis" (fig. F) used at the Limerick docks by J. Neville, C.E., is explained on p. 273 of the same volume. H. Robertson's description of a new lewis would appear to be somewhat similar in principle to figs. C, D and G; *INSTITUTION OF CIVIL ENGINEERS, Minutes*, 8vo., London, 1837, p. 26; *CIVIL ENGINEER*, etc., *Journal*, i, 39.

A correspondent to an early number of the *MECHANICS' MAGAZINE* (1824), notices that on the borders of England and Scotland the blocks of hard whinstone are removed "by forming a perfectly circular and perpendicular hole in the stone of about a-half or three-quarters of an inch in diameter and about 3 ins. in depth; into this is driven with a hammer a cylindrical iron bolt of about the same length with a hole or ring to receive the tackle by which the stone is to be raised, the diameter of the bolt to be only so much smaller that it will not need much force to drive it to the required depth. Blocks of three or four tons were raised out of the ground, which had not been removed around it. It can only be applied to hard and tough stones, and not to Bath and other freestones." LIFTER.

LEWIS (JAMES), was born about 1751 probably at Brecon, in South Wales. He published *Original Designs in Architecture, consisting of Plans, etc., for Villas, Mansions, Town Houses, etc., and a new design for a Theatre*, 2 vols., fol., London, 1779-80 and 1797, with 61 plates. Among those in the first volume (the executed works are marked *) are, pl. 2, villa at Hadleigh, in Suffolk; pl. 7*, a uniform façade to three houses in Great Ormond-street, Bloomsbury; pl. 12*, villa and offices for R. P. Thelwall, esq.; and pl. 19, design for a new opera house in Pall-mall. Volume two comprises, pl. 1, corn-market and store-houses intended for Limerick; pl. 3*, 1782 alterations to house and offices at Bletchington, Oxfordshire, for Arthur Annesley, esq.; pl. 9, temple at Lodore, near Keswick, for Rowland Stephenson, esq.; pl. 11*, villa at Lavington, Sussex, for John Sargent, esq., M.P.; pl. 13, casino at Lough Coutra near Gort, Galway, for John Prendergast Smyth, esq., M.P.; pl. 15*, greenhouse at Haynes, Bedfordshire, for lord Carteret; pl. 16*, Eydon-lodge, Northamptonshire, for Rev. Francis Annesley; pl. 19*, alterations at Sutton, Bedfordshire, for Sir Mountague Burgoyne, bart., and a temple there for Lady Burgoyne; pl. 21, theatre at Limerick, with residence for J. P. Smyth, esq., M.P. communicating, noticed as "designed 1788 before the Pantheon, new opera-house, or Covent-garden and Drury-lane theatres, as now existing were built"; pl. 25, villa at Lodore, Cumberland, for Edward Stephenson, esq.; pl. 27*, alterations at Nasing, Essex, for William Palmer, esq.; pl. 29, Coole-house, Galway, for Robert Gregory, esq.; pl. 31, 1789, villa near Cork for the Rt. hon. Silver Oliver; pl. 35, park entrance at Longleat, Wiltshire, for the marquis of Bath; pl. 36, a public museum; and, pl. 38, 1777, hospital for lunatics in Old-street Road (afterwards erected by G. Dance), probably submitted in competition.

In 1777 he surveyed the estate belonging to the Bedford charity, in the parishes of S. George the Martyr and S. Andrew's Holborn. He was appointed 13 June 1793 surveyor to Bridewell and Bethlehem hospitals, and 18 April 1811 "received the thanks of the court of governors for the great ability displayed by him in the plans for the new Bethlehem hospital" in S. George's Fields, the first stone of which was laid 18 April 1812, and was opened in August 1815; it accommodated 198 patients, and cost £122,572: Upton acted as deputy architect. The portion erected by Lewis comprised the centre and parts of the east and west wings and portions of the wings extending southwards. Some additions were made by his suc-

cessor, P. Hardwick, R.A., and more extensive ones during the last twenty-five years by S. Smirke, R.A.; the building in 1868 affords accommodation for three hundred and twenty-four patients. A perspective view and a (now defective) plan of this edifice is given in the *ALLGEMEINE BAUZEITUNG*, fol., Vienna, 1841, pl. 397-8. On the 27 January 1792 he was elected architect and surveyor to Christ's hospital, Newgate-street, succeeding R. Norris. On the 29 November 1793 he received "a gratuity of one hundred guineas for his great attention during the building of the new grammar schools," as he had charged only 2½ per cent. instead of "five per cent., the usual charge of gentlemen of his profession upon new buildings"; this edifice has been nearly rebuilt. In 1793 he made a design for many additions to cost about £15,400: March 1794 a model was ordered to be made of a design he had prepared "for the uniform and gradual rebuilding of the hospital", still to be seen in the surveyor's office, comprising a three story edifice 360 ft. by 285 ft., round an interior colonnaded court 264 ft. by 190 ft.; a smaller design was made in 1795, but neither were carried out; views were exhibited at the royal academy of arts in 1799 and 1800. He also designed 1800 the dining hall, and the infirmary, to the school at Hertford. In 1798 he exhibited at the royal academy his design for Eydon-lodge, above noticed: and in 1799 surveyed S. Peter's church at S. Alban's, recommending the tower to be taken down; CLUTTERBUCK, *Hertfordshire*, fol., Lond., 1815, i, 116. Between 1806-13 he was associated with G. Dance, jun., R.A., in the erection of the royal college of surgeons, Lincoln's-inn-fields, which has been materially altered by Sir C. Barry, R.A. He was one of the fifteen original members of the architect's club, founded 20 Oct. 1791; MULVANY, *Life of Gandon*, 8vo., Dublin, 1846, p. 296. His style was similar to that of the Adams. P. Moore and E. Gyfford were his pupils; Geo. Hawkins was a clerk. On account of long continued ill health, he resigned his office at Christ's hospital, 26 January, and that at Bethlehem hospital, 5 April, 1816; and died 16 July 1820 in Powis-place, "aged 69 years", leaving a good fortune to his two sons, John Henry, who retired to his father's house at Totteridge in Hertfordshire, and subsequently sold the estate at Delgny near Dolgelly, and the rev. Edmund Burke, and two daughters. * W. P.

LEWYNE (JOHN) was the master mason employed at Durham upon the kitchen of the monastery 1368-70, when he received 66s. 8d. per quarter and a gown worth 13s. 4d.; (RAINE), *A Brief Account*, 8vo., Durham, 1833, p. 114. This is probably the same "mason" who is named in a writ, 10 July 1379, Pat. 2, Richard II, p. 1, m. 47, as ordered to take "latomos et alios laboratores" for works at the castles of Carlisle and Roxburgh; RYMER, *Fodera*, fol., London, 1717, xvii, Syn., 4591, No. 95.

LEYRE (WILLIAM DE), with J. LE CONYERS and R. de Refham, were employed at Westminster palace; BRITTON, *Palace*, etc., 8vo., London, 1836, p. 114; 128.

L'HASSA, in Tibet. See LASSA.

LI, LE or LY. A measure of length used in China and Tibet; its exact quantity does not appear to have been satisfactorily ascertained.

1 le = 606 English feet (Cavallo.); or 1 le = 180 fathoms = 632 imperial yards; 200 les = 1 degree of the meridian; WATERSTON, *Manual of Commerce*, 8vo., Edinburgh, 1840.

In GIBBON, *Decline*, etc., 8vo., London, 1854, iii, 160, it is noticed that "according to the present standard 193 lis = 1 degree of latitude; an English mile therefore exceeds 3 lis of China. But there are strong reasons to believe that the ancient li scarcely equalled one half of the modern li. D'ANVILLE, in *Mémoires de l'Acad.*, ii, 125-502. *Mesures Itinéraires*, pp. 154-67."

LIABILITY. The risk of being compelled to answer for, or to, anything. Thus, for example, the surety for a builder's performance of a contract incurs liability of being responsible

to an employer, limited by the extent of the guarantee; there may be two or more sureties in joint or separate liableness, as may be expressed in the bond: if the builder either fulfils or makes void his contract the liability disappears, but if he should fail in either of these respects it would become a responsibility. The use of the word 'liability' for 'liableness', and for 'being obliged to fulfil or repel a responsibility', is to be regretted. RESPONSIBILITY.

LIABLENESS. The proper term for the state of liability.

LIAIS. In Paris this is the name of a compact carbonate of lime, nearly pure, being the hardest bed of the sub-division known as the 'calcaire grossier' of the tertiary formations: in the provinces of France the same term is applied to the argillo-calcareous secondary deposit, properly called the LIAS: whence confusion sometimes arises. It is used for division walls about 8 ins. thick. *Detached Essay*, ABATTOIR, p. 3.

LIARDET'S CEMENT. A cement or stucco, formed with oil. It was extensively used, if not really invented, by Messrs. Adam, who were the virtual plaintiffs 1778 in the cause *Liardet v. Johnson*, as noticed *s. v.* Adam (R.). It did not, however, prove successful, as after some time it separated in masses from the brickwork and scaled off. Nos. 97 and 147 Hyde-park corner, Piccadilly; and Harewood-house, Hanover-square, are said to have been faced with it; NOBLE, *Professional Practice*, 8vo., London, 1836, p. 55.

LIAIS STONE, see BLUE LIAS: HYDRAULIC LIME; CALVADOS; KEYNSHAM. It may be well to note in addition to the paragraph *s. v.* blue lias, respecting its application as a building material, that it was used in erecting without any framed centre a bridge 60 ft. span and 10 ft. versed sine, across the Birmingham and Gloucester railway, at Dunhamstead, co. Worcester; *Minutes of the Institution of Civil Engineers*, 1841, i, 136; reprinted in *CIVIL ENGINEER*, etc., *Journal*, 1841, iv, 394; and DEMPSEY, *Practical Railway Engineer*, 4to., Lond., 1850, p. 101, or 4th edit., 1855, p. 154. This material has also been used in the new rooms at the British Museum, and at the Post Office in S. Martin's-le-grand; for outside work in Belgrave-square, Hyde-park-gardens, and the club chambers, Regent-street; DONALDSON, *Stucco*, in *ENCYC. METROP.*, 1843. Columns of blue lias were used 1844-45, by B. Ferrey in the church in Endell-street, London. Paving stones of blue lias are sent from Keinton-Mandeville, and Long Sutton, near Langport-Eastover, both in Somersetshire; the last named place is said to furnish a very durable stone. Langport and Somerton churches were built from the Loadbridge quarries. The blue lias of Street in Somersetshire, has hitherto been used almost exclusively for paving, steps, and rough building purposes; lately it has been found that it may form a substitute for marble, as it is said to be susceptible of a good polish; some shafts are being prepared for a new church at the west end of London; *BUILDER Journal*, 1868, xxvi, 343.

White lias stone, weighing 131 lbs. 12 ozs., per cubic foot, is obtained from Beer Crocombe, and from Weston near Bath; in both places it has a very light cream colour, takes a good polish, and would probably stand well for interior work. Blocks may be procured 6 to 7 ft. long and 2 ft. thick. It is said to have been used in the neighbouring churches; in S. Peter's church, Exeter, in exposed positions; in the churches at Colyton and Hinton, in Devonshire; and in that at Charmouth, in Dorsetshire. It is also obtained at Paulton and Radstock, in Somersetshire, taking a very smooth and beautiful surface when polished; *BUILDER Journal*, 1851, ix, 716. Bridgewater and Taunton churches were built of this stone obtained from the Loadbridge quarries above noticed.

LIBERGERS, improperly called Liberberger and Leberger, with Henri and Joes for the Christian name (HUBS or HUGUES), commenced, as stated on his gravestone, the church of S. Nicaise at Reims on the Tuesday after Easter (17 April) 1229, and died on the Saturday after Easter (7 or 14 April) 1263: this edifice, destroyed 1793, is considered to have been one

of the early specimens of pure Gothic in France. He is also thought to have designed the *portail*, with the two towers, and the transepts; and is said to have been succeeded by R. de Coucy. The sculptured gravestone was removed by the inhabitants into the cathedral at Reims, where it is placed north of the south transept; it exhibits his figure holding a measuring rod (about 5 ft. in length) in one hand and a church in the other; at his feet are carved a square and a pair of compasses (as stated by some writers, but more probably a crampoon for lifting stones). FELIBIEN, *Recueil*, 4to., Paris, 1686, p. 207; whilst DIDRON, *Annales Archéologiques*, 4to., Paris, 1844, i, 82; TARBÉ, *Notre Dame de Reims*, 8vo., Reims, 1852, p. 94; and DALY, *Revue Générale*, fol., Paris, 1840, i, 195, illustrate the stone; the inscription is also given in VIOLETT LE DUC, *Dicte.*, s. v. *Architecte*, i, 110. CERF, *Hist. de Reims*, 8vo., Reims, 1861, i, 390-40, contains an elaborate inquiry on the designers of the church and cathedral, stating also that the latter was commenced by Liberigiers in 1240, and finished 1270 by R. de Coucy; *Notice sur l'hôtel de Cluny*, 8vo., Paris, 1834, p. 149. 5. 69. 116.

LIBERTY; TEMPLE TO. A building, thus named, was erected on the Aventine hill at Rome, by the grandfather of the celebrated Tiberius Sempronius Gracchus; according to LIVY, xxiv, 16, who states xxv, 7, that its court was inhabited by the hostages from Tarentum: it was decorated with statues and bronze columns by C. Asinius Pollio. The goddess Libertas was represented in white robes, holding a rod with one hand, and a cap with the other: the latter was, according to VALERIUS MAXIMUS, 2, viii, 6, and other ancient writers, a mark of freedom used on all occasions; it, as well as the rod, referred to the customs used by the Romans in liberating their slaves. Sometimes a cat is found placed at the feet of the deity, this animal being very fond of liberty, and impatient when confined. Statues of Libertas were common among the ancients; the figure, or its emblems, may be seen on medals especially on those of the emperor Galba, A.D. 68. 6.

LIBON (Gr. *Λιβων*), erected the temple to Jupiter Olympius at Olympia, near Pisa in Elis, on the west of the Peloponnesus, which is generally dated B.C. 450, because Phidias began B.C. 436 his chryselephantine statue to be placed in it. Libon is supposed to have also erected the accompanying temple to Juno, yet PAUSANIAS, v, 10, who notices that Libon was a native of the district, specially mentions that the name of the architect of that edifice was forgotten. 59. 117.

LIBRARY (It. and Sp. *biblioteca*; Fr. *bibliothèque*; Ger. *bibliothek*; from the Gr. *βιβλιοθήκη*: the It. and Sp. *libreria* now mean a bookseller's shop, as did always the Fr. *librairie*, from the Lat. *librarium*, which had that sense). An apartment, a suite of rooms, or an edifice, intended to contain books. The notice s. v. BIBLIOTHECA, of the libraries of classic times, should be supplemented by the following notes on others in the middle ages.

The library in S. Gall was placed over the scriptorium, and adjoined the presbytery; it was generally situated towards the north; it is placed next the slype at Finchale priory; south of the choir at Wimborne; over the chapter-house at Dunfermline, Eastby, and Lichfield; in an upper room near the south transept at Westminster; and near the north transept at Hereford and Gloucester. The libraries at Wells, and the Grey Friars, London, were of considerable length. At septuagesima, an inventory was taken; WALCOTT, *Church, etc., Arrangement*, 8vo., London, (1861). At Hereford and at Wells, the books are still seen chained to the shelves.

It has been stated that a large or public library should be of good proportions, lofty, fireproof, well-aired, lighted, and warmed: placed on the first floor, or over a vaulted chamber, having but one external wall, with windows facing the north (PEACHAM, *Compleat Gentleman*, says to the east, "to avoid moths and mouldiness"), imparting an ever steady light without the glare of sunshine, which parches and fades the colours of

bindings and other contents. It should be surrounded with shelves, and if lofty enough, should also have a gallery for access, sufficiently wide to permit two persons to pass; on no account should the cases approach the ceiling, where in most rooms the air is hot and vitiated, and tends to impoverish and to destroy the leather and other materials (GAS, *Effects of*, p. 15). The lower shelves, to contain the folios and other large works, may project about 20 ins. to afford a ledge about the height of an ordinary sideboard, on which to rest small books. The space above will contain quartos and works of every day use. The gallery shelves will hold the octavos and smaller works, and others of less frequent reference than those placed in the lower cases. The gallery front should have a light ledge or overhanging desk on which to rest the volumes. If possible the shelves in every part of the library, except for the folios, should be of one depth, so that the books when necessary may be shifted *en masse*: and they should not be more than about 3 ft. in length (BOOKCASE). If the cases be provided with doors, they should be hinged so as to open quite back, to allow the end volumes to be taken out easily; if the lock be made with a spring much trouble will be saved in closing the cases, and one key to pass all the locks is a further saving: of course the cases containing the more valuable books, and the medals, prints, etc., will have separate keys. The floor will be covered with felt, or some such substance that can be easily cleaned, and will deaden the sound in walking. Some large libraries have the cases projecting from the window side into the apartment, affording bays in which persons can study in quiet: in the Bodleian library at Oxford, these compartments have gates: in Trinity college, Dublin, the students are not allowed to read in these recesses, but at the tables in the centre of the room; this is the arrangement in University college, London.

The tables are generally about 9 ft., 12 ft., or 18 ft. long, by 4 ft. wide, with 5 ft. or 7 ft. between each table and the presses, for access and reference; they are covered with leather or cloth: chairs, easy without being luxurious; and portable desks; are acquisitions: reading cushions for very heavy books or for those having metal mountings or bindings, are of service; such books should never be placed on the shelves, as they would injure the adjoining volumes, but in cases with thick glass tops that the books may be seen: under the cases may be presses with sliding trays for very large volumes of plates, and for portfolios; and a light waggon for carrying books is desirable in a very large establishment. Two or three pair of dwarf steps, light and strong, having the wheels or castors under the step portion only, to prevent accident; and a step ladder, if the cases be so high as to warrant the use of it in preference to the steps, should be amongst the other furniture provided. HINGE, p. 60.

The following table contains the sizes of some of the more remarkable libraries in the world, with reference to the publications in which they are described; the articles on the towns and cities themselves should also be referred to.

LONDON,

| | | |
|--|---|--|
| British Museum, King's (Sir R. Smirke) | 300 by 41 by 30 | |
| | 58 centre | |
| British Museum, reading room (S. Smirke) | 140 diameter | { BUILDING NEWS, 1857, iii, 157, 449-55. |
| | 120 high | |
| University College (T. L. Donaldson) | 91 by 21.6 by 32 | |
| | 45 through recesses. | |
| London Institution (M. Brooks) | PUGIN and BRITTON, <i>Public Edifices</i> . | |
| Lincoln's Inn (P. Hardwick) | 80 by 40 by 35 | CIV. ENG., etc., vii, 31; viii, 235. |
| Middle Temple (H. R. Abraham) | 53.1 by 42 by 62 | BUILDING, xii, 567; xvii, 200. |

CAMBRIDGE,

| | |
|-------------------------------|-------------------|
| Trinity college (Sir C. Wren) | 190 by 40 by 37.3 |
| University | ... |
| Corpus Christi | 87 by 22 by 25 |
| King's | 93 by 27 by 18 |
| S. John's | 150 |

OXFORD,

| | |
|----------------------|---|
| All Souls' | 198 by 32 by 40 |
| Bodleian | ... Three large rooms in shape of H. |
| Exeter (G. G. Scott) | 56 by 20 by 40 CIV. ENG., etc., xxi, 275. |

| | |
|---|--|
| Oxford (continued), | |
| Queen's | 114 by 31 by 26 |
| Oriel | 83 by 28 by 28 |
| Worcester | 100 by 30 by 37 |
| | { 141 |
| Redcliffe (J. Gibbs) | 49 diam. 85 high. Work by Gibbs, 1747. |
| Blickling | 127 by 21 NEALE, iii. |
| Hatfield house | 67 by 27 by 18 BUILDER, xvii, 492. |
| Blenheim palace (Sir J. Van- brugh) | (183 5 by 31 9 by 28) NEALE, iii. |
| Plymouth public and Cottonian library (J. Wightwick) | { 28 by 20 } Andla- { CIVIL ENGINEER, etc. { 1650, xiii, 316. |
| Heythorp | 83 by 20 by 20 |
| Luton Hoo | 144 total length of five rooms, <i>en suite</i> . 25,000 vols. NEALE, <i>Seats</i> , i. |
| Shelburne or Lansdown house | 105 by 30 by 25 Three rooms, <i>en suite</i> . |
| Caen wood, Hifgate | 68 6 by 22 by 25 6 |
| The three last are by R. Adam, and are given in his <i>Works</i> . | |
| Thorndon | 95 by 20 by 32 |
| Arundel castle | 122 by 21 by 20 NEALE, <i>ser.</i> 2, iv. |
| Liverpool, Free library | 75 by 27 30,000 vols. in this and the student's library. CIVIL ENG., etc., xxiii, 322. |
| Dublin, Trinity college | 208 by 41 by 40 46,000 vols. 38 double cases 9 ft. proj., 15 ft. high. Gallery over. |
| PARIS, S. G  n  v  re (old) | EXCISE, D'ARCHITECTURE, 13 pl. |
| " (new, Labrousse) | EXCISE, D'ARCHITECTURE, 34 pl. |
| " Nationale (or Royale), now Imp  riale | BATELIER, 1850, pl. 386; DALY, <i>Revue G  n.</i> , x, pl. 21, etc., about 150,000 vols (1852). CIVIL ENG., etc., <i>Journal</i> , xiv; BUILDER, xi, 184. |
| Havre (Brunet Debaines) | DEBAINES, <i>Mus. Bib.</i> , 1845. |
| Cambridge, U.S., Harvard college | 140 by 81 80-90,000 vols. Cross- shaped, with gallery. BUILDER, x, 467. |
| New York, U.S. Astor (Fa  tner) 1851, ix, 722; xii, 248; CIVIL ENG., xiv, 506. | 100 by 64 by 50 100,000 vols. BUILDER, 1851, ix, 722; xii, 248; CIVIL ENG., xiv, 506. |
| Rome, Vatican (D. Fontana) | |
| Venice, St. Mark's (Sansovino) | GAILHARAU, <i>Monuments</i> . CICOGNARA. |
| Sienna, cathedral library | GRANDJEAN DE FAMIN, <i>Architecture Toscane</i> . |
| Milan, Ambrosiana | 127 by 66 by 74 Or in the range. |
| " Brera | |
| Cesena | D'AGINCOURT, <i>Architecture</i> , pl. 72, No. 14. |
| Florence, Lib. Mediceo-Lauren- ziana (M. A. Buonarroti) | { 153 by 38 4 88 seats or desks. Rossi, <i>Lib. Med. Lat.</i> , fol., Rome, 1739. |
| " Magliabechiana | —by 48 About 130,000 vols. |
| " Riccardi | 61 by 18 6 The largest of several rooms. 617 books and 3590 MSS. |
| Portugal, Mafra | { 28 8 by 32 by 36 6 } a cross. in recess { 304 by 71 at trans } <i>Gent. Mag.</i> , Sept. 1837. |
| Copenhagen, Royal | |
| St. Petersburg, Imperial | |
| Frankfort (Hess) | GRANVILLE, <i>S. Petersburg</i> , 1835, i, 154, 161-2. |
| Munich, Royal (F. von Gaertner) 240 by 45 by 60, about. | BUILDER, 1846, iv, 91; GARNIER, <i>Sammlung</i> , 1844-7. |
| Vienna, Imperial | (90 in centre. |
| Leyden | Interior engraved by VON DANUS, fol., 1610. |
| Hamburgh, Gynnasium (Wim- mel and Forsmann) | 195 by 37 by 26 3 With a gallery. ALLO- BAU, 1839, pl. 292-4, 200,000 vols. and 5000 MSS. |

The usual form of a library is oblong, but other shapes have been erected; thus the library at Birmingham, 1798, has a circular reading room lighted from a dome, supported by Ionic pillars. The ducal library at Wolfenb  ttel is circular. DELESSE, a member of the chamber of deputies at Paris, published *M  moire sur la Biblioth  que Royale*, 4to., Paris, 1835, with two folding plates; an account of it is given in LITERARY GAZETTE *Journal*, for 9 April, and in LONDON, *Architectural Magazine*, 8vo., London, 1836, iii, 235-6. He proposed that the reading room should be circular, with eight galleries abutting and radiating from it, each about 120 ft. in length. This rotunda would hold 800,000 volumes in a space of 1,900 toises carr  es or 77,690 sq. ft. English. Each room was divided in its height by four galleries, with cases not more than 6 ft. in height. The eight galleries were to form grand divisions for classification, as theology, jurisprudence, government, commerce and finance, natural history, the sciences and arts, general literature, with history, voyages and travels; and the galleries were subdivided into 56 equal parts. The circular library and reading room, 140 ft. diameter, at the British Museum, London, designed by S. Smirke, R.A., was commenced in 1854, and opened in 1857.

VIRIVILLE, *Histoire de l'Instruction publique en Europe*, 4to., Paris, 1849: DALY, *Des Biblioth  ques publiques*, in *Revue G  n  rale*, 1849, viii, 415-37, pl. 38-42 of plans; xiv, 49, pl. 8: GAUCH  , *Projets d'  difices pour transf  rer la Bibl.*, fol., Paris, 1841: LEIGHTON, *Formation and Arrangement of the Library*, read at Society of Arts, Feb. 1859; and partly reprinted with woodcuts in BUILDER *Journal*, xvii, 167; and *Library, Books and Binding*, 4to., London: EDWARDS, *Memoirs of Libraries*, 8vo., London, 1859, ii, 664-727, with plans and views; and his *Libraries and Founders of Libraries*, 8vo., London, 1865: PAPWORTH, *Museums, Libraries, and Picture Galleries; with the Public Libraries Act*, 1850, 8vo., London, 1853: ENCYCLOPEDIA BRITANNICA, 8th edit., 1857, xiii: GWILT, *Encyclop  dia*, § 2908-12. The acts of parliament relating to free libraries, are 13 and 14 Vic., c. 65, and 18 and 19 Vic., c. 70.

The library, in an average sized house, is an apartment used not only as a depository for books, but as a sort of morning room also for the gentlemen, for writing, and in some measure for lounging, as well as for reading, and should be arranged *en suite* with the principal dwelling rooms. It should be kept sufficiently quiet to prevent interruption of reading and writing. An eastern aspect is recommended, so that the sun may be off the windows early in the day. A front light from the left is required for persons engaged in writing, which is easily secured by an end window; the fireplace ought to be placed so as to afford a good winter fireside, as the library is in a great measure a sitting room. When the library of a small house is used as a study, or as a business room, a door into the dining room may be very useful, as tending to make it serve as an occasional waiting room; a lobby or small anteroom will, however, effect this convenience in a larger house. If the owner of the library be a man of learning, a separate room or study must be provided; and to a house of any importance, a spare room or large closet, to contain books newly received or set aside for binding or other such purposes, is very needful, and this is sometimes amplified into a librarian's room.

A library ought in every instance to be carefully ventilated, as otherwise there will arise from the books a well-known odour of mustiness; and as dryness to a more than ordinary degree is also essential, the outer walls should be battened. When a heating apparatus is required in addition to an open fire, care must be taken to prevent any currents of dry-heated air passing near the books, as they materially affect the leather and so destroy the binding. The bookcases should be made of well-seasoned deal, pine, mahogany, or wainscot, with backs, a small space being left under and behind them for circulation of air. The height of the cases may depend upon their use; if a space, say of two or three feet be left between the top of the cases and the ceiling, it may be occupied by busts, vases, or other small features: if larger, paintings and prints are sometimes placed there when not requiring special lighting. KERR, *Gentleman's House*, 8vo., Lond., 1865, 2nd edit., 117; 188.

LICENCE. There are some proceedings that otherwise would be forbidden, or, at least, impugned, which may be done under an authority previously obtained; the protection may be unlimited, or subject to conditions; the proceeding and the authority are equally called a *licence*; but the document, which expresses the nature or extent of authorisation, is known in particular cases by peculiar names, as certificate, consent, dispensation, pass, permit, warrant, etc. APPRAISEMENT; CRENEL; FACULTY; HOARD.

From the commencement of a negotiation for a site until the actual occupation of a structure, the architect may have to deal with circumstances which require that 'leave or licence' should be obtained: among the earliest claims of this nature upon his attention may be the tenure of the property, for in some manors a copyhold tenant cannot demise or lease the property, unless he procures a special licence for that purpose from the lord. The ground landlord, the adjoining owners, the neighbours (especially if on crown property), the Metropolitan

Board of Works, the Commissioners of Sewers, or the Local Board, the District Surveyor, the Inspector of Nuisances, have various powers; to whom may be added any Board that is concerned in his structure, e.g. the Poor Law Board in the case of a workhouse.

LICENCE. In criticism upon art, the term licence is employed in perfect conformity with the definition above given; it is applied to any deviation from a general rule, for which novelty is the authority rather than good taste; and which may be so acceptable as to become the germ of a new fashion; thus every stage of transition from one phase of a style to another, may be regarded as a period of licence. This licence may be in the best case a happy stroke of genius: but otherwise simply a vagary of a barren invention, mistaking mere eccentricities for ideas; and then if carried out in contempt of all restraining conditions of common sense and taste, it becomes an abuse, a fault, or a vice. **ACCOMPLISHMENT.**

LICHAVEN. One of the names given to a dolmen.

LICHENS. A class of flowerless cellular plants. They are not easily distinguished from fungi, and the difficulty of discrimination promises to increase in proportion to further investigation into their nature. The existence of a lichen upon masonry gives the appearance, much prized by artists, of a green, grey, brown, yellow, red, or black, stain: as, however, some architects may desire to destroy it without scraping the stone, or may wish to prevent it, the following recipes have been printed. A solution of white oxide of arsenic, the common arsenic of commerce, in soft water, is recommended for the destruction of the vegetation by W. Bromet, in the *BUILDER Journal*, 1846, iv, 260. A notice that salts of various kinds promote green vegetation on stone; and reasons for thinking that solutions of lime destroy the readiness of the stone to receive the seeds; are given by C. H. Smith in the *BUILDER Journal*, 1854, xii, 365. For the destruction of the vegetation the walls should be washed with a dilute solution, say half-ounce of bichloride of mercury (corrosive sublimate) to one gallon of water; or else with arsenious acid in a weak solution of common pearl-ash; according to W. L. Scott, in the *BUILDER Journal*, 1857, xv, 65. It has been recommended "never to remove or clear the mossy surfaces" of old stonework, as the growth is a proof of the durability of the material employed, besides the agreeable diversity of tint given to the building.

LICHFIELD. often improperly written Litchfield. A city in the county of Stafford, in England. It was formed into an episcopal see at an early period, and was united with Coventry 1121, but separated since 1836. The streets are commodious, well-paved, and lighted; and contain a number of well-built houses, amply supplied with water from springs rising about a mile south-west of the city: one conduit only now remains, over which a clock tower was erected 1863-4. The bridge at the head of the pool was built 1816. The railway bridge of white stone over S. John-street was designed, 1848, by Thomas Johnson of Lichfield; a view is given in the *ILLUSTRATED LONDON NEWS*, 1849, xiv, 244.

The cathedral is dedicated to the Virgin and S. Chad. The foundations of the original Norman apse remain below the choir, together with those of a long square-ended chapel added beyond the apse about 1180, and removed for the new choir about 1200, to which date is ascribed the lower part of the three westernmost bays (the clearstory is of 1325), with the sacristy on the south side: the gallery over the door opening at the back into a small room over the groined vault of the sacristy, may have served as a watching chamber for the great shrine of S. Chad. The south transept dates about 1220; the north transept about 1240; for their construction king Henry III granted licences in 1235 and 1238 to the dean and chapter to take stone from the forest of Hopwas (*BARRON*, p. 27); the vaulting shafts of both transepts are Early English; the vaulting, plain lierne with large bosses, dates from the beginning of the fifteenth century, to which period belongs that of the

central tower. The chapter-house and its vestibule date about 1240; the latter has the form of an elongated octagon, and was restored in the early part of the present century; the room over, of the same date, was probably the original library and record room. The nave dates about 1250; its original stone vaulting remains only in the two westernmost, and in the first eastern, bays; the remaining bays show the imitation vaults put up by James Wyatt: the peculiarity of the roofing of the aisles and the openings of the triforium are described in *KING*, p. 278, and are noticed hereafter, *s.v.* TRIFORIUM.

The west front, with its two towers and spires and arcading, dates about 1275; the whole of the details and statues, however, are restorations in cement, made 1820-22; the tracery of the great window was the gift of the duke of York, afterwards king James II, it having been destroyed in 1643. The three portals are deeply recessed in three orders; the rich ironwork covering the modern doors is ancient. The lady chapel dates about 1300, with its polygonal apse and the eastern bay of the retrochoir. About 1325 the Early English choir was completely taken down as far as the third pier east of the tower and was replaced by that which now appears: the lower part only of the first three bays eastward of the tower was allowed to remain, as above-noticed. The vaulting, being now uncoloured, exhibits the natural tint of the red sandstone; it had been painted of a stone or vellum tint, with other colours over it. The presbytery, formed by the three easternmost bays beyond the stalls, dates about 1325; the two eastern bays between the reredos and the lady chapel now form the retrochoir as they did before the Reformation.

The chief portions of the existing cathedral are thus of the Early English and Decorated styles. *WILLIS* says "the gradual changes at Lichfield have a singular parallelism with those at York", and "the plans of the two cathedrals rival each other in the simplicity of their proportions." A dated record would render Lichfield cathedral "one of the most valuable for the history of the development of the styles." Some windows of the Perpendicular period have been inserted. During the siege of the town 1642 the centre spire fell and injured the roofs, the choir stalls were pulled down, the window glass smashed, the floor broken up, and the tombs ransacked. This spire was rebuilt by bishop Hacket 1662-69 from a design by Sir C. Wren. J. Wyatt (about 1788-95) effected various alterations and incorporated the lady chapel with the choir. T. Johnson appears to have directed the new west and east windows 1789-92.

Repairs, as to the chapter house, were made 1820-22; those between the years 1853 and 1857 chiefly to the transepts and external masonry in many places, and 1856 the reopening of the pier arches of the choir, were done under the direction of S. Smirke, R.A.; others were made 1857-60 (*BUILDER Journal*, xvii, 414, 796), and from 1860 a general restoration was commenced under the direction of G. G. Scott, R.A.; the probable expense is noticed in xviii, 440; 584. The oak stalls of the choir, with the substalls having fronts of open metal work, coloured blue and bronze, with red berries and white flowers, are by Evans of Ellaston. The choir screen by Skidmore of Coventry, is an elaborate example of artistic metal work; the first of its sort in modern times but since exceeded by that at Hereford; he also executed the gates to the aisles: the reredos, 1863-4, executed by J. B. Philip, 12 ft. wide and 20 ft. high to top of the cross, is of alabaster from quarries near Tutbury, with inlaid Derbyshire marbles; a view is given in *BUILDER Journal*, 1864, xxii, 865. The pavements (originally of cannel coal and alabaster placed lozenge-wise) in the eastern part are of tile by Messrs. Minton, with incised marbles by Messrs. Clayton and Bell, the slabs of stone are from Hopton wood. The very fine eagle lectern is by Hardman. The font 1862 by W. Slater, is engraved in *BUILDER Journal*, xx, 168.

Seven of the nine windows in the lady chapel are filled with glass procured 1802 by Sir Brooke Boothby from the abbey of

Herckenrode near Liège (it dates 1530-40); the designs are by Lambert Lombard (Mrs. JAMESON, *Legends of the Monastic Orders*, 8vo., London, 1852), "the first and by far the best of the Italianized-Flemish school of the sixteenth century": the two westernmost windows have glass by Sir John Belton of Shrewsbury, who repaired the old glass. The south window of the aisle of the south transept, and the east window of the south aisle of the choir, contain other portions of the Flemish work. The window over the door on the north side of the north transept is by Sir J. Belton about 1812; that in the great west window dating after 1776 is by Brookes. WINSTON, *Memoir on Painted Glass*, in the *Archæological Journal*, 1860, xxi, 193. In the south aisle are two ancient effigies much mutilated; a few other early tombs exist: one to bishop Hacket (died 1670); a bust 1793 to Dr. S. Johnson (died 1784), that to D. Garrick (died 1779), with the tomb to A. Newton (died 1806) are by R. Westmacott; that to Anne Seward, 1809, is by J. Bacon, R.A.; that to the daughters (cir. 1814) of the Rev. William Robinson, known as the "Sleeping Children", is by Sir F. Chantrey, R.A., who also sculptured that to bishop Ryder (died 1836); a brass 1854 to the earl of Lichfield; the memorial to major S. R. Hodson, killed at Lucknow 1858, engraved in CIVIL ENGINEER, etc., *Journal*, 1859, xxiii, 288; and that to archdeacon Hodson, both designed by G. E. Street; are the most interesting of the monumental memorials.

This edifice, one of the smallest cathedrals in England, is said to have been the model for Coventry cathedral. The whole of the choir and the lady chapel incline considerably to the northward. The building presents, in its triple spires and polygonal apse, two unique and special features among English cathedrals. There is no crypt, but on the south side of the lady chapel are three small chantries or cells. WILLIS gives the following dimensions of the structure; the nave of eight bays, 142 ft. long; the aisles 15 ft. wide from pier to wall; the choir and presbytery of eight bays, 142 ft. long; the transepts, nearly 142 ft. long from north to south; and the lady chapel, 52 ft. long. Mr. Scott has furnished the following dimensions taken for the purpose, many of which will be found to vary from those hitherto put forward. Nave 139 ft. long, 64 ft. 7 ins. total width, and 60 ft. high; south aisle 13 ft. wide, north aisle 12 ft. 6 ins.; transepts 149 ft. long, 28 ft. wide: choir and presbytery 137 ft. 3 ins. long, 27 ft. 9 ins. wide: lady chapel 53 ft. 8 ins. long, 27 ft. 9 ins. wide: the total length is 371 ft. The chapter house 40 ft. 3 ins. long, 27 ft. 5 ins. wide. The centre tower, 111 ft. 3 ins. high to the top of the battlements (and 138 ft. more to the top of the ball of the spire); and the western towers 92 ft. (and 103 ft. more).

The other churches comprise that of Stowe, or Chadstowe, on the spot where traditionally S. Chad built his oratory and died; a small temple has been erected over his well: S. Mary, rebuilt 1721, the tower and spire since rebuilt from designs by G. E. Street: S. Michael, temp. Henry VII, the aisles rebuilt 1844; an open roof substituted, and the chancel rebuilt 1846: there is a roman catholic church dedicated to the Holy Cross; and three dissenting chapels.

The bishop's palace built 1687: the vicar's hall 1757: the theological college opened 1857: the friary, now a dwelling, it dates 1545: the guildhall partly rebuilt 1846: the market hall rebuilt 1849 by T. Johnson and Son; the upper room or corn exchange is 63 ft. long and 34 ft. wide; the savings' bank adjoins: the whole is given in ILLUSTRATED LONDON NEWS, 1850, xvi, 32: the union poor-house 1841 is by Messrs. Scott and Moffatt: the theatre 1790: the jail and house of correction: the free museum and public library 1857-9 by Messrs. Bidlake and Lovatt of Wolverhampton, cost £1,350, *BUILDER Journal*, xvii, 319: the free grammar school, temp. Edward IV, but rebuilt 1850: S. John's hospital 1495 with thirteen almshouses for men, one of the early examples having chimneys; an aisle to its curious chapel was added 1826: and Milley's hospital; are among the few other noticeable structures.

HARWOOD, *History, etc., of the Church and City*, 4to., London, 1806; *A Short Account of the City*, 8vo., Lichfield, 1819; GRESLEY, *Siege of Lichfield*, 12mo., London, 1840; 2nd edit., n. d.; BRITTON, *Lichfield Cath.*, 4to., London, 1816; WINKLES, *English Caths.*, 8vo., Lond., 1835; *A Short Account of Lichfield Cath.*, and, *Guide to the City of L.* (both published by LOMAX), new edit., 8vo., Lich., (1861-67); KING, *Handbook to the Western Caths.*, 8vo., Lond., 1864; WILLIS, in the *Archæological Journal* of the Archæological Institute, 1861, xviii, p. 124; *BUILDING NEWS Journal*, 1861, xi, 602; and an earlier notice on the restorations, 1860, vi, 684. Three views of the restorations are given in the CIVIL ENGINEER *Journal*, 1859-60, xxiii, 29-30, and xxiv, 4.

LICHGATE, sometimes written LYCHGATE. The term, derived from the Saxon *lic, lice*, a dead body, is applied to an open shed, which in some places covers the entrance gate to a churchyard, so as to form a shelter under which a bier or coffin is rested on the way to the grave. In the prayer book of 1549 the priest is directed to meet the corpse at the 'church style' which was altered to 'entrance of the churchyard' in that of 1662. In some parts of Devon and Cornwall the lichgate is called a "trim-tram", probably a corruption of the words 'trim-train', as the spot where the mourners might be placed in order before the burial service was commenced; NOTES AND QUERIES *Journal*, 3rd ser., iii, 29. It is also called 'corpse gate'; and in Herefordshire, 'scallage (or scallenge) gate.'

A gate formerly existed near Gloucester cathedral, and under it the corpse of king Edward II rested 1272 on its way to interment; it was rebuilt by his successor, and the side walls remained 1845 at the bottom of College-street. At Bray church, Berkshire, the lichgate has over it two chambers connected with an ancient charitable bequest, on one of the upright timbers of the gateway is cut the (genuine?) date of 1448. The supposed lichgate at Barking abbey, Essex, has one such chamber over it, called the chapel of the Holy Rood, but this gateway may have had nothing to do with the lichgate but served as part of the defences of the monastery.

As lichgates are scarce even in England, to which country they are considered to be peculiar, the following list of examples may be useful. It is probable that not one of them is so much as three centuries old: they are of timber unless otherwise described.

| | |
|--|---|
| Arundel, Sussex, re-erected as a north porch to the church. | *Heston, Middlesex. |
| Ashwell, Hertfordshire. | Kirkburton, Yorkshire; destroyed. |
| *Beckenham, Kent. | *Lenham, Kent. |
| Luckingham, Lincolnshire. | Llandogo, Monmouthshire. |
| Berryn Arbor, Devonshire, in form of a cross. | *Moorwinstow, Cornwall, stone. |
| Birstal, Yorkshire (CHURCH BUILDER <i>Journal</i> , 1862, p. 48). | Pulborough, Sussex. |
| *Boughton Mouchelsea, Kent; with a recess on south side. | S. Peter, South Weald, Essex. |
| Bromsgrove, Worcestershire. | Staple, Kent; double gateway. |
| Burnside, Westmoreland. | Tavistock, Devonshire. |
| Compton, Berkshire. | Throleigh, Devonshire, 15th cent. |
| Cradley, Herefordshire, cir. 1635. | Troutbeck, Westmoreland, 3 stone gates to one cemetery. |
| *Garsington, Oxfordshire (<i>Glossary of Architecture and CHURCH BUILDER</i>). | Trelleck, Monmouthshire. |
| Hartfield, Sussex; under a house. | *West Wickham, Kent. |
| Hayes, Middlesex. | Whitbourne, Herefordshire, circa 1635; with a stone stile. |
| Those marked * are given in the <i>Illustrations</i> 1861, and 1867. | Deanery of Woolleigh, Devonshire; nearly every one of its twenty-four churches. |
| | Worth, Sussex. |

The dimensions of the timbers at West Wickham are, principal upright piece, 9½ ins. by 6 ins.; oak cill at foot, 7 by 6; bracket pieces and struts, 5½ by 4; transverse beams, 7 by 6; middle longitudinal beam, 7½ by 5½; middle transverse beam, 8 by 6; rafter plate (eaves), 6 by 5; common rafters, 4 by 3½; and small curved brackets 4½ thick.

J. D. W.
In Devonshire the lichgate was formed by "a gabled wall built up on either side of the church path, and a roof built from one gable to the other on stout beams. Of such a fashion was the old 'bier house' (as it is locally called), at Tormoham,

and Paignton, in Devonshire, both destroyed; and such still exist at Marldon, Abbots-Kerswell, Manaton, Prior's Dean, Drewsteignton, Bovey-Tracey, Wolborough, and many other places. On one of the beams at Abbots-Kerswell is carved "Fear God — 1605, Honor y^e King." A new lichgate of this sort erected by W. Butterfield at Yealton, has been illustrated in *CHURCH BUILDER Journal*, 1862, p. 44: and one by J. Thomson was erected in 1851 at Leigh-de-la-mere in Wiltshire. At Bickington, and at Throwleigh, the bier house is associated with the *CHURCH HOUSE*: at the former place the house is built over the lichgate, at the latter, on one side; in both cases all the work is of Perpendicular date. The curious arrangement for opening and closing the gate at Burnsall, Yorkshire, is described in the *CHURCH BUILDER Journal*, *Stones of the Temple*, 1862; a similar one is seen at Rostherne, Cheshire. At Tavistock, Devon, there is a small room on either side of the gate, probably for the distribution of refreshments"; *NOTES AND QUERIES Journal*, 4th ser., i, p. 423; 445. A lichgate from S. James, Staple, Kent (large and narrow gateways), is given by the *ECCLIOLOGICAL SOCIETY*, *Instrumenta Ecclesiastica*, 4to., London, 1844-47, pl. 34-5; and one for stonework, pl. 65-6.

LICH HOUSE. A term proposed by the *ECCLIOLOGICAL SOCIETY*, *On Funerals*, 8vo., London, 1851, p. 5, for a *DEAD-HOUSE* or mortuary, as a place for the reception of bodies before burial. A design for one with a gateway is given in the *Instrumenta Ecclesiastica*, above noticed, 2nd series, 1850-56, pl. 5-8.

LICH STONE. It is usual in Cornwall and some other counties, to carry the coffin underhanded by white cloths passed through the handles and beneath it; this custom explains the arrangement, called the 'lich stone', for resting the corpse at the entrance to the churchyard. This stone is often found without any building attached to it; and frequently without even a gate. It is either oblong with the ends of equal width; or narrower at one end than at the other like the shape of the ancient coffins, but without any bend at the shoulder: and the bearers occupy stone seats at the sides whilst the coffin remains on the lich stone. At Lustleigh, in Devonshire, is an octagonal lich stone called "bishop's stone", having the arms of Cotton, bishop of Exeter 1598-1621, engraved upon it; *BUILDER Journal*, 1862, xx, 541-2. At Trelleck church, near Monmouth, the lich stone is placed in the centre of the churchyard on the south side; it is an oblong slab resting on four short stone piers placed on another slab. The top of a lich stone is, generally, barely 3 ft. from the ground. Of the same nature a still greater variety exists on Penarth common, Monmouth, being under an oak tree far from any church; *ATHENÆUM Journal*, No. 1817, 23 August 1862, p. 251. In Cornwall, at S. Levan, there is a gate with seats, cross, and stone: and at S. Winnow (illustrated in *CHURCH BUILDER Journal*, 1862, p. 97, a stone without a gate; *NOTES AND QUERIES Journal*, 4th ser., i, p. 445.

LICINIUS ALEXANDER (CAIUS), is known from an inscription containing the words C. LICINIUS M. LIBERTVS . . . ALEXANDER ARCHITE . . . etc., found near the church of Sta. Croce in Gerusalemme at Rome: it is given in *GRUTER, Corpus Inscript.*, fol., Amsterdam, 1707, i, p. 623, fig. 2.

LIDEFORD (ELIAS DE), sacrist of Gloucester cathedral, rebuilt the west tower which was taken down about 1422 for the new front: but WILLIS, in *BUILDER Journal*, xviii, 510, states that "Hilarius" the sacrist rebuilt the north west tower 1222, now pulled down. He is said to have vaulted the nave (completed 1242), the monks themselves labouring at it; and to have erected the stalls (which were removed 1337-77); a fragment existing behind the first stall on the north side may be his work. *FROUCESTER, Chronicle* (1381-1412) states that he brought an aqueduct into the church, and that the so-called 'reliquary' or lavatory against the north wall of the north transept, is this work. He died in 1237. *KING, Handbook to*
ARCH. PUR. SOC.

the Western Cath., 8vo., Lond., 1864, p. 24, 29; *DALLAWAY, Discourses*, 8vo., London, 1833, p. 188.

LIDHOLT. An oak board costing 6d. in 1331, used for making moulds or templates for masons; *BRAYLEY AND BRITTON, Palace*, etc., 8vo., London, 1836, p. 154.

LIÈGE (Flemish *Luik*, and German *Lüttich*). The capital of the province of the same name in Belgium. It is traversed by the river Maas or Meuse, here joined by the Ourthe, both having stone quays, some well planted, and by the stream Légie which passes through the older part of the town. Of the many (17) bridges, the principal are; the pont des arches 1648-57 having six semicircular arches from 50 to 60 ft. span, 460 ft. long, 49 ft. 3 ins. wide, was built at a cost of 315,954 florins; *LAVALLAYE, Notice historique*, in the *MESSAGER DES SCIENCES ET DES ARTS*, 1834, p. 465; the pont de la Boverie was rebuilt 1841-3; and the pont du Val S. Benoît near the city, consisting of five stone arches; all its details are given in *ALLGEMEINE BAUZEITUNG*, 1845, p. 261-5, pl. 682-3, from the *Annales des travaux publics de Belgique*. The city is entered by nine gates, the most remarkable of which is that of Amécœur: the citadel on the heights of Ste. Walburge was rebuilt 1650 and again in 1820. It is the see of a bishop suffragan to the archbishop of Mechlin; and it is the Birmingham of Belgium. The oldest streets are narrow, often steep; and their houses, which date in the sixteenth and seventeenth centuries, are more German than French in character, as they have high roofs (few are gabled to the street) upon timber frames filled with brickwork which enclose several low storeys lighted by many square windows: the warehouse of the merchant Curtius, built 1623, is now the mont-de-piété: two houses in the rue Louvrex, and a pavillon de campagne, all three designed by A. Castermans, are given in *CASTERMANS, Parallele — de Bruxelles*, fol., Paris, 1854, pl. 23-6; pl. 79; and pl. 104-18. The chief of the eleven squares are, the *place S. Lambert*, and the *place du grand marché* or de l'hôtel de ville, containing the pedestal called the *perron*, having on each side of it at a few feet distance a large fountain of cast-iron erected 1696 from designs by J. Delcœur, who also designed 1696 that of the Virgin in the rue Vinave d'Ile, and 1667 (? 1697) that of S. John the Baptist in the rue Hors Château of bronze. A covered arcade was constructed 1837-9 by Lemonnier. A colossal bronze statue 1842 by W. Geefs of the composer A. E. M. Grétry is fixed in the *place* of the same name.

The cathedral, dedicated to S. Lambert, was destroyed 1793; it is described with an illustration in *SCHAYES*, ii, 95; iii, 28, 136, from *VAN DEN STEEN, Essai historique sur l'ancienne cathédrale*.

The collegiate church, dedicated to S. Paul, has since 1802 been the cathedral; the nave is 222 ft. long, the choir 84 ft. long and 82 ft. high: the choir, dating about 1280, is very pure in style; but its *rond-point* is partly of the fourteenth, and partly of the fifteenth, century: the side chapels date 1528, the vaulting of the nave 1557, the upper part of the tower and spire 1813: the edifice was restored by J. C. Delsaux 1858-60, who designed the sacristy on the north side of the choir; and the arabesques of 1579 in the vaulting were then carefully repainted: the stained glass in the south transept dates 1530, that in the choir is of later date and far inferior; the small window in the chapel of the chapter, in the manner of the fifteenth century, is by J. B. Capronnier: the cedar wood pulpit with white marble statues and canopy, is by W. Geefs: the flamboyant tracery and prismatic tracery of the three-sided cloisters on the south of the church belong to the period 1475-1525. The church of S. Jacques had its first stone laid 26 April 1016 and was consecrated 1030; it is 262 ft. long, 98 ft. wide, and 65 ft. high, with a north transept 19 ft. 8 ins. wide; this is not only one of the finest religious edifices in Belgium, but is also one of the most perfect specimens in Europe of the *style ogival tertiaire* in full glory without licenses; the arches between the nave and aisles are cusped, and their spandrels arc

filled with *renaissance* decoration; the triforium of the nave has a double tier of quatrefoils over low trefoiled arcades; above them is a blank arcade carrying the windows, which are each divided by a light shaft and pinnacle besides the mullions: the aisles are panelled with a blank arcade and a parapet resembling the triforium in front of its windows: the choir, similarly designed, has canopied statues on brackets at the height of the parapet: the spiral double staircase from the choir to its upper story is considered a masterpiece of construction. The tower dates 1163-73; the body of the church was rebuilt 1513-38; the glass dates 1520-40 and is very good: the flamboyant porch of the north aisle was designed 1552 by L. Lombard, called Susterman, who added 1558 the *portail* of the Corinthian order in the *style de la renaissance*; a plan, sections of the porch, some ornaments, and the groining showing the coloured decorations, are given in WEALE, *Quarterly Papers on Architecture*, 4to., London, 1844-5, i and ii; and by DELSAUX, *L'église de S. Jacques*, 15 plates, fol., Liège, 1845; LAVALLEY, *Notice Historique sur l'église*, above quoted.

The following are the other churches. S. John the Evangelist, rebuilt 1754-57, except a Romanesque tower of the twelfth century, a small portion of the cloisters of the fourteenth century, and the old refectory, converted into a chapel: the round church of former times is given in SCHAYES, ii, 96. S. Denis, consecrated 990; the twelve pillars of the nave, and the tower still covered with a slated roof as not having been completed, belong to the original construction, but the end of the choir and the transepts date from the thirteenth century; the ancient ground plan seems to have been preserved; the church was much altered in the eighteenth century, to which period the four aisles evidently belong, is given in SCHAYES, ii, 97, it has suffered in some late restorations; the seven windows of the apse have modern glass by J. B. Capronnier; the reredos is of the fifteenth century. S. Bartholomew, 1010-15, five aisled, having at the west end two brick towers each 14 ft. 6 ins. by 13 ft. 10 ins., is shown in SCHAYES, ii, 115; the interior (except the triforium) was modernized and the south (only) porch was rebuilt in the eighteenth century; the brass font, cast at Dinant in 1112 by L. Patras, was formerly in the baptistery of the old cathedral. S. Martin, designed by P. de Rickel, was built about the same period as its rival S. Jacques, and was finished 1542; it is a three-aisled cruciform church, 250 ft. long by 70 ft. wide, with a lofty west tower; the choir and north aisle were restored 1850-55 by J. C. Delsaux, who also restored the tower 1858; the interior of the rond point is shown in SCHAYES, iii, 229: the glass in the apse and choir are of the sixteenth century. Ste. Croix, originally a castle built 713, was converted 979 into a church by bishop Notger; it is a three-aisled building with a pentagonal apse to the chancel of Second Pointed style, 160 ft. long, but at the west end of the nave is a semicircular apse and an octangular brick tower 1175, given in SCHAYES, iii, 30: it is the only old example in Belgium of aisles as high as the nave; the architect is said to have decamped before the centres of the vaulting were struck; this tradition may have been invented, but it suits the unusual method of springing the arches of the aisles from the caps of the piers, while those of the nave are corbelled from the shafts themselves: the edifice has been restored by J. C. Delsaux; the glass in the apse 1854 is partly by Kellner of Munich, and partly by J. B. Capronnier. S. Servais, rebuilt 1584; the glass in the aisles is of the same date; that in the choir in the manner of the sixteenth century is by J. B. Capronnier. S. Giles, founded 1082, rebuilt and made an abbey 1124, but secularised in 1786. S. Christopher, founded 1180, exteriorly a good example of the transition style; the interior was completely modernized in the eighteenth century; it has a pulpit and inner portals well carved. S. Veronica, rebuilt 1848 from designs by — Dujardin. S. Catherine, now served by the Jesuits, rebuilt soon after 1691. S. Faith, founded 1108. S. Anthony of Padua, originally a church of the Fran-

ciscans, founded 1244; has been modernized; the façade dates about 1620; it has some good carved wood work. Notre Dame, the church of the Carmelites, built 1617; it has a remarkable façade erected 1642; since 1838 it has belonged to the Redemptorists. S. Margaret, which has been rebuilt. S. Walborge, built 1614. The church of the Barefooted Carmelite nuns was rebuilt soon after 1468; that of the Benedictines in the boulevard d'Avroy, erected 1627; that of the Seminary, formerly a Premonstratensian abbey, rebuilt 1762 by Digneffe, cruciform in plan with semicircular apses, and a central dome, was a fine work of the Doric order until the recently painted decoration was added. The two desecrated churches, that of the Augustinians on the boulevard d'Avroy, and that of S. Andrew in the *place du grande marché*, were both rebuilt about 1765 by B. Renoz.

The palais de justice, the former residence of the prince bishops, was rebuilt 1508-39; it has two large quadrangles, one of which is 195 ft. 6 ins. long, and 138 ft. wide, surrounded by a vaulted cloister 18 ft. 4 ins. wide and 21 ft. high with four angle piers and fifty-six candelabra-shaped columns of blue stone, all different and elaborately carved by F. Bordet, a native of the city, who executed the sculpture to the very different shafts of the cloister on two sides (only) of the smaller court; it is shown with details in GAILHABAUD, *Monuments*, 4to., Paris, 1850, iii: the palace was restored 1734-37, after the fire which had destroyed the façade as well as the attic story of two sides of the chief quadrangle, by Anneessens of Bruxelles, and completed by J. N. Chevron about 1800: it is given in the ALLGEMEINE BAUZEITUNG, 1853, pl. 597-600 as rearranged and restored 1848-56, (except the brick tower, which alone remains of three *tourrelles* that originally had bulbous spires and the façade), with a new wing built by J. C. Delsaux to serve as the hôtel of the provincial government: an illustration showing the court yards is given in SCHAYES, iv, 75, who adds a compartment from the work printed by DELSAUX. The hôtel de ville was rebuilt 1714, the interior is furnished in the style of Louis XIV. The university inaugurated 15 Sept. 1817 occupies the extensive buildings of a Jesuit college, and is rich in collections of various kinds; the botanic gardens were altered by J. N. Chevron; its public library comprises 80,000 volumes and 465 MSS; the columns of the portico were formerly in the church. The round church of the Dominicans, built about 1655-75 by B. Flémalle, occupied the site of the theatre (*salle académique*) erected 1818-22 by A. Dukers, with an Ionic portico 1823, the shafts of which are of S. Rémy marble with caps and bases of cast iron; it is also attributed to J. N. Chevron; it is given in GOETGHEVER, *Choix*, fol., Ghent, 1827, p. 73. The abattoir was designed by J. N. Chevron. The halle des drapiers, rebuilt 1555 and partly in 1788, is now an industrial school. The large cellular prison was erected about 1850 by — Dumont in a modern castellated gothic style; the chapel is so arranged that every prisoner can see the altar without being perceived by his fellows; the stained glass in the style of the fifteenth century is by J. B. Capronnier. The other public buildings, including nine of the hospitals, do not appear to require notice.

The faubourg d'Amersœur, on the east side of the river, contains about fourteen small bridges, and the long road called the rue Grétry, north of which is the casino 1837-9 by Remont, which has a ball room 135 ft. long, 50 ft. wide and 45 ft. high: the fort on the site of the Carthusian church built about 1650-75 by B. Flémalle with a choir before 1733 by P. Kourz; a view of the former monastery built 1705, is given in SCHAYES, iv, 206: the church of Remacle at Cornillon, which was rebuilt soon after 1612: the church of S. Nicholas rebuilt 1711: the caserne des écoliers: the hôpital de Bavière: and the church of S. Pholien, the nave and aisles date 1189; the chancel and transepts were rebuilt 1858-60 in the style of the thirteenth century from designs by — Halkin; the tower was rebuilt about 1850 in a modern style. South of the rue Grétry is the

church of S. Vincent at Fétine, rebuilt 1724-34. On the hill called Publemont are the interesting remains of the abbey of S. Laurence: and about twelve furlongs from the porte S. Laurent is the celebrated priory of S. Nicholas at Glain; the church consecrated 22 July 1151 was rebuilt in the eighteenth century, but the chancel preserves a good romanesque arcade on the outside; it is given in SCHAYES, ii, 156, from the *MESSAGER DES SCIENCES HISTORIQUES DE BELGIQUE*, 1839, p. 413.

WEALE, *Handbook to Belgium*, etc., 8vo., London, 1859; STAPPAERTS, *Belgique Mont.*, 8vo., Brux., 1840, ii, 143-70; WAUTERS, *Délices de la Belgique*, 8vo., Brux., 1816, p. 302-22; HEATH, *Picturesque Annual*, 8vo., London, 1841, p. 278; STAPPAERTS and STROOBANT, *Monuments d'Architecture en Belgique*, fol., Brux., 1853-5; STROOBANT, *Splendeurs de l'Art en Belgique*, 4to., Brux., 1848; WEBB, *Continental Ecclesiology*, 8vo., London, 1848, p. 24-9; DELSAUX, *L'architecture des monuments du moyen âge à Liège*; SCHAYES, *Histoire de l'architecture en Belgique*, 12mo., Brux., 1850-3; KINT, *Les délices du pays de Liège*, 200 pl., fol., Liège, 1738-44; *Histoire de la Principauté de L.*, 8vo., 1817; POLAIN, *Liège Pittoresque*, 8vo., Brux., 1842; *Fues de L.*, 24 lith. pl., 4to., Liège, (1849). The 'ancien pied de Liège' measured 0.292 of the French metre. 50.

LIEGE (BOUCHARD and GUILLAUME DE) were canons of the former cathedral of S. Lambert in that city, who were considered to be skilful architects, and who built about 1275 the magnificent *portal* between the *parvis* of that church and the street; VAN DEN STEEN, *Essai historique sur l'ancienne cathédrale*, Liège, p. 12.

LIEGE (HEZELON DE), see EZELOON and CLUNY.

LIEN. A French word, signifying a tie or other means of bondage, which has been preserved in English legal phraseology for the right of one man to retain in his possession that which belongs to another until certain demands are satisfied; but this explanation has the defect of not showing the difference between lien and pawn, mortgage, or pledge. The natures of particular and general lien are matters of considerable interest to the architect as a principal and as an agent: they deserve his study at the very commencement of his professional career, so that he may understand the means of their origin and extinction. Amongst the works which largely treat on this subject, besides those named s. v. Contract, are MONTAGU, *On Liens*, who gives a number of particular instances; CHITTY, *On Contracts not under seal*, 8th edit., 8vo., Lond., 1868; and (Sir W.) JONES, *Essay on the Law of Bailments*, 8vo., Lond., 1781, s. v. Vadium, and Locatum; CROSS, *Law of Lien*, 8vo., Lond., 1840. 14.

LIEN. The native name of a tree obtained in the forests of Amherst, East Indies, affording a valuable, compact, heavy, homogeneous, wood, of a deep brown colour, not attacked by insects. It is used for posts and rafters for houses. 71.

LIERNE RIB. The term (probably derived from the French *lier*, to tie, or bind together), for the short ribs introduced in the early Perpendicular period, which ran from the arcs doubleaux to the tiercerons and thence to the arcs ogives; as shown at D to I, and E to K, in fig. 5, given s. v. Groined vaulting.

LIEVAIN (. . .) continued 1714-20 the Theatine church of Ste. Anne-la-Royale near the quai Malaquais at Paris; begun 1662 by C. G. GUARINI. He died about 1720. 5. 69.

LIFT. A contrivance brought into use, in public and private buildings of great height, to save the trouble and labour of often ascending lofty flights of stairs. It is made of various sizes according to the requirements; some lifts being intended to carry up heavy weights; others only small articles. The principle of formation is very simple. A square vertical shaft is made from floor to floor, having the sides formed with matched board lining; in this a sort of tray is suspended by balanced weights hung with lines and pulleys, so that a slight exercise of manual labour will enable anyone to send it up or

down. On every floor is a vertical opening in the front of the tube, generally closed by sliding or lifting shutters, by means of which the articles are put in, or are taken out, when sent up or down. The larger trays should have friction rollers. Every lift should be furnished with a speaking tube, with mouth pieces, a bell, etc., so that notice may be given for the proper articles to be placed in the lift, and that attention may be given at both ends of the tube for placing or removing the articles. A. A.

It was perhaps Dr. Cap who in 1857 first proposed in one of the Paris papers to employ lifts for private dwellings in order to obviate the inconvenience of living in lofty houses; *BUILDING NEWS Journal*, iii, 1024, 1050: but the oriental mode of raising water from a well by a wheel may have suggested the mill work made about 1560 by Gilbert van Schoonebeke to raise water from a reservoir in buckets for the Guild of Brewers at Antwerp: an endless band or chain of buckets has long been known by English brewers as a 'Jacob's ladder'; it has also been used for lifting materials to the top of a smelting furnace; and an endless band to raise boxes of coals, papers, etc., was in use before 1852 at the government offices at the corner of Downing-street. Indeed, some sort of machinery for such a purpose has been long in use in large establishments; in 1831-32 chemicals, etc., were raised in trays from the laboratory to the room or museum over it at King's college, London. A description of a lift for a strong room occurs in *CIVIL ENGINEER*, etc., *Journal*, 1855, xviii, 394; and Bellhouse's fireproof doors for warehouse lifts, are given in *ILLUSTRATED LONDON NEWS*, Sept. 1851, xix, 299. Particular attention to ease of action and absence of noise, is required in the machinery now employed for lowering a coffin into a catacomb; the earliest employment of such a lift in England, is said to have occurred 1817 at Windsor at the burial of the princess Charlotte of Wales.

The lift fitted 1848 to the coal mine 200 ft. deep at Somain, and still employed, consists of a pair of connecting rods opposite to, and balancing, another pair with alternate motion communicated by machinery: the beams traverse 50 ft. at each lift, mere planks carrying the workmen: every pair has spring catches for the waggons which rest at each stroke on stages a little less apart than the length of the stroke. The *Reports of Inspectors of Coal Mines* for 1856, and later, contain figures of lifts.

In very extensive hotels there is often a lift so large as to contain luggage, and even persons, who are landed on the different floors to which they desire to go: it is then generally called an "ascending room"; and it is often, if not always, worked by hydraulic power. It consists of a ram that is free to move upwards when the pressure is brought to bear upon the column of water acting in a perfectly water-tight cylinder. The action of such machines requires that the reservoir of water should be established well above the point desired to be commanded. These, with other varieties of lifts, have been noticed by WHIGHAM, *On Hydraulic Lifts*, given with illustrations in the *Sessional Papers* of the Royal Institute of British Architects, 18 January 1864: the description of the lift or hoist used at the Westminster palace hotel, read at the same society 3 March 1862, is reprinted in *BUILDER Journal*, xx, 164; and a model of a common warehouse lift, shown at the Great Exhibition 1862, is noted in the same *Journal*, xx, 712.

Lifts may be fitted with an apparatus for preventing the box falling in case of the rope breaking. Baines's patent safety for a hoist was fitted up in Manchester in 1857, as detailed in *BUILDER Journal*, xv, 14 March. (Ads. first page); his patent "hoist governor", in 1858, xvi, 575, was described xvii, 140. A description of a 'pneumatic lift' for raising coal, etc., near Dudley, by GIBBONS, read at the Institution of Mechanical Engineers, Birmingham, was printed in *CIVIL ENGINEER*, etc., *Journal*, 1849, xii, 297, with an illustration. DERRICK; ELEVATOR; GYN; HOIST; JACK; LADDER; SHEERS; WINDLASS.

LIFT BRIDGE, see HOISTING BRIDGE. The hydraulic

accessory establishment on the Rhine on the railway station at Homburg and Ruhrort, is given in the *ALLGEMEINE BAUZEITUNG*, fol., Vienna, 1855, pl. 734-41.

By the water lifts in the Bridgewater canal, the boats are raised bodily instead of adopting the usual system of locks and pounds, where there is a difference of level. Hood's lift bridge over the Grand Surrey canal, near London, is described in the *PRACTICAL MECHANIC'S JOURNAL*, 4to., Glasgow, 1850, iii, 44, as read at the Inst. of Civil Engineers, 2 April 1850.

LIFTER. Besides the machines called CRAMPOONS and LEWIS, the following remarks are suggestive. ALBERTI, *De re Architectura*, 1485, b. vi, ch. ix, describing the lewis, also states that "for taking up any weight and especially of stone, the ancients had a kind of pincers or forceps of iron. In very large stones, and especially in the middle of columns, I have seen little knobs left jutting out, like handles, against which the ropes were hitched to prevent their slipping"; ALBERTI, translation by LEONI, fol., London, 1755, p. 124, 2 plates. The use of a crampoon in the construction of the pier at Aberdeen, by — Gibb, C.E., is shown in HANN and HOSKING, *Theory, etc., of Bridges*, 8vo., London, 1843, i; reprinted in *CIVIL ENGINEER, etc., JOURNAL*, 1840, iii, 29-30. In several of the ancient temples the ends of the stones had grooves cut in them leaving a block whereby the ropes were held for lifting them; examples at Agrigentum are given in COCKERELL, *Temple to Jupiter Olympius*, in the volume supplementary to STUART and REVETT, *Antiquities of Athens*, fol., Lond., 1830, pl. viii.

Another form of 'stone lifter' consisting of a bar of iron with a sliding piece and screw, is figured in *CIVIL ENGINEER, etc., JOURNAL*, x, 262, and in *BUILDER JOURNAL*, 1847, v, 339, but on p. 354, is described a better form with two bars. ECK, *Recueil de Machines*, fol., Liège, 1840, pl. x, gives two complicated machines for raising capitals and other sculptured work. A lifter for laying stones so that lewis holes shall not appear on the bed, which originated at the dry docks of the United States naval yard, New York, is given in the *ILLUSTRATED LONDON NEWS JOURNAL*, 1849, xv, 276.

LIGEMENT, see LEDGEMENT TABLE.

LIGGER, see LEDGER.

LIGHT. A substance, or an accident, according to the views taken by the two schools, into which the modern world of science has divided in its consideration of the subject. The usual theories of the causes of light have been nearly, if not quite, superseded by the theory of oscillation or the undulatory theory, which teaches that every luminous body, by a rapid vibratory motion of its molecules, is continually producing and produce in the space filled by an imponderable æther universally diffused, in all directions, a series of oscillations; these penetrating the eye, cause the retina to vibrate and produce in the optic nerve the sensation which constitutes vision. Such vibrations have been calculated for red and violet light at 450 and 780 billions of oscillations per second respectively, any number, more or less, producing no luminous phenomena. White-light or daylight is considered to be a mixture of oscillations of all possible velocities, and the colour of a body is the result of the body's power of extinguishing some vibrations while reflecting others: black being the result of reflecting quantities so small as not to affect the eye. Light requires 16 minutes 36 seconds to travel the diameter of the terrestrial orbit or twice the distance of the earth from the sun, which gives for its velocity 190,000 miles per second. The stars nearest the earth are at least 206,265 times the distance of the sun, consequently the light which they send requires $3\frac{1}{4}$ years to reach the earth. As for the stars which can only be seen by telescopes, they may have been extinguished for millions of years. Some peculiarities of light are noticed in the articles ACTINISM; CHROMATOBLAPSY (Achromalepsy or Daltonism); SHADE AND SHADOW. ALL THE YEAR ROUND *Journal*, *Recent Discoveries concerning Light*, 1861, v, 270.

LIGHT AND AIR AND ANCIENT LIGHTS. The technical name for that enjoyment of natural lighting and ventilation, now governed by the statute 2 and 3 William IV, cap. 71, called The Prescription Act, 1833, under which, operations to save an ancient light are taken. Clause 3 of the Act, is: "When the access and use of light to and for any dwelling house, workshop or other building shall have been actually enjoyed therewith for the full period of twenty years without interruption, the right thereto shall be deemed absolute and indefeasible, any local usage or custom to the contrary notwithstanding, unless it shall appear that the same was enjoyed by some consent or agreement expressly made or given for that purpose by deed or writing." This act does not extend to Scotland or Ireland. WOOLRYCH, *Law of Window Lights*, 12mo., Lond., 1864; LATHAM, *Law of Window Lights*, 12mo., London, 1867.

Since the articles, AIR, LIGHT, etc.; EASEMENT, etc., were printed, very much litigation on this subject has occurred, in the course of which the following principles appear to have been admitted, subject of course to particular exceptions: 1. that the light affected should be that light which has been actually enjoyed for twenty years; 2. that possible future damage should not be taken into consideration; 3. that it must be useful light which is obstructed, and not a view or prospect; 4. that the damage must be substantial and material, i.e. such as to affect the complainant's business or convenience to a considerable degree; 5. that the light in question is not sunlight, but exposed sky-surface; 6. that the rule that any building may be so raised that its top shall not exceed an angle of 45° from the window obstructed is empirical; and 7. that so far as a building has been actually completed the courts of equity will prefer to leave the plaintiff to his remedy at common law. The substitution of reflected light, by means of glazed tiles, etc., has been held to be no answer to the complaint.

As regards the "measurement of light" it has been said that it cannot be calculated like that of wheat in a bushel, or water in a cistern, nevertheless it is of great consequence to show at least the proportionate diminution occasioned by the erections complained of, and (if possible) the degree of adequacy of light which is left. This subject has been treated by KERR, *On Ancient Lights, and the Evidence of Surveyors thereon*, etc., 8vo., Lond., 1865. In considering the minimum quantity of light necessary to a dwelling room for ordinary purposes, he takes the example of the ground floor of a good London street of average size, and supposing the houses standing opposite each other are of the same height as the width of the street, he shows that the ordinary sizes respectively assigned to the windows are such, that one foot of window-width lights 50 feet superficial of floor, or one foot superficial of glass about 7 feet superficial of floor: following the same line of argument he shows, that one foot of a skylight will be sufficient to light 20 ft. sup. of floor. Then, as to the estimation of abridgment of light caused by the erection of new buildings, he supposes a transparent surface in the form of half a hemisphere to be placed in front of the window, representing half "the vault of the sky" and this to be divided vertically and horizontally; to each of the divisions thus formed he assigns a value, as a source of light, in proportion to the degree and directness or efficiency with which the light enters therefrom into the window: the original sky-line as viewed from the window is then to be traced on this transparent surface, and in like manner, the altered sky-line: the difference between the two will show the proportionate abstraction of the light formerly enjoyed; and upon the abridgment of light, so ascertained, an estimate of the amount of substantial and material damage may be grounded. This subject was treated in the same manner by the same author, *On the evidence of Architects in the obstruction of Ancient Lights*, read at the Royal Institute of British Architects, *Sessional Papers*, 1865-66, p. 149, with the subsequent discussions thereon. SKYLIGHT.

It was formerly held that any alteration in the size of an ancient light was a forfeiture of the right; but Lord Westbury, a short time ago, doubted whether this was sound law, as he said the fact of enlarging a window seemed to infer the plaintiff wanted more light than he had formerly got instead of wishing to abandon what he already possessed; but this *dictum* seems only to apply to the notion, that any enlargement *ipso facto* was an abandonment of the right altogether, and does not affect the old rule as to the alteration of the character of the building, as laid down in the case of a malt-house. An ordinary winter day is considered the fairest time for the calculation.

The latest and best law on this subject is to be found in the appeal to the House of Lords in the case of *Tapling v. Jones* in 1866. Jones abandoned old lights and made new ones; Tapling obstructed them: Jones then reinstated the old windows stopping up his new ones, and he then recovered everything he demanded. The judgment seemed to affirm the doctrine that the right to an ancient light was not forfeited or lost by a temporary abandonment. Under this judgment the law on this subject may be considered quite settled.

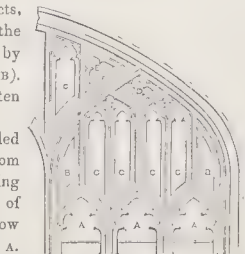
14. In the case of a new window being opened, which may overlook adjoining ground, other remedies than the court of chancery must be resorted to, such as a screen of boards, a wall, etc.; for chancery will not restrain a man from opening as many windows as he likes. The only remedy is to set up a screen, or to give a notice, which must be constantly renewed. Until Lord Tenterden's (the Prescription) Act, the obstruction of old views by new buildings was privileged in the City of London; this custom appears in the assize of 1189, printed by TURNER and PARKER, *Dom. Arch.*, 8vo., Lond., 1851, i, 18; it states that "if any one shall have windows looking towards the land of a neighbour, and although he and his predecessors have been long possessed of the view of the aforesaid windows, nevertheless his neighbour may lawfully obstruct the view of those windows, by building opposite to them on his own ground, as he shall consider most expedient; except he who hath the windows can show any writing whereby his neighbour may not obstruct the view of those windows." In illustration of this clause, an agreement dated 1249-50 is given in the GENTLEMAN'S MAGAZINE, 1860, ix, 3rd ser., p. 412-3, between John de Lanfar, clerk, and William de Auverne, citizen, in respect of two windows looking upon the clerk's garden.

LIGHT. The opening or space between the bars of a sash rebated to receive the glass. According to their number it is called a six, eight, or twelve, light sash. CASEMENT; FAN; LANTERN; OYLET; PIVOT; SASH; SKY; WINDOW. A. A.

In mediæval architecture, it is the space (A in the subjoined woodcut), between the tracery or plain mullions, usually filled with lead work and glass; it was formerly called BAY, or DAY.

LIGHT; ANGEL. A term used by William of Worcester and other mediæval architects, and intended to describe the outer light, which is cut off by the curve of an arch (as at B). It probably should be written "angle" light, from its form.

The lights c c, are each called a BATEMENT LIGHT, either from the piece at the bottom being cut off, or because they are of less width than those below them.



LIGHT; ARTIFICIAL. The illumination produced by the ignition of combustible materials, as candles, gas, etc. The estimation of the comparative economy of any two species of illuminating media involves two considerations, the amount of light obtained from each, and its cost in a given time. The divergent rays lose their intensity in the ratio of the square of the distance from the point whence they emanate: thus, the light furnished by a luminous body at 1, 2, and 3 yards is, at 2 yards 4 times,

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and at 3 yards 9 times, less than it is at one yard. If the light from two unequal media, to be compared, be made to fall from equal distances on a sheet of paper placed against a wall, and an opaque body be interposed, the shadows on the paper will be seen to differ in intensity, the stronger light producing the deeper shadow, and the weaker the fainter. If, then, the weaker light be moved nearer to the wall until the shadows are seen to be equal in depth, and the distances be then found to be say 3 and 4 ft. respectively, the power of the stronger in relation to the weaker will be as 4×4 or 16 to 3×3 or 9 showing $\frac{16}{9}$ or 1 for the amount of the weak light required to produce the amount of illumination furnished by the strong one. The relative cost of the two modes of obtaining the same amount of light may then be ascertained by noting the quantity of each material consumed in a given time, and their respective costs.

The following table exhibits the amount of carbonic acid and heat generated per hour by various sources of light, each equal to 20 sperm candles burning at the rate of 120 grains of sperm per hour.

| | Carbonic acid, cubic feet. | Heat, 100 | | Carbonic acid, cubic feet. | Heat, 100 |
|--|----------------------------|-----------|-----------------------------------|----------------------------|-----------|
| Tallow | 10.1 | 100 | Manchester gas | 4.0 | 32 |
| Wax | 8.3 | 82 | London gas (1 company) | 3.0 | 22 |
| Spermaceti | 8.3 | 82 | Boghead hydrocarbon gas | 2.6 | 19 |
| Sperm oil (Carcel's lamp) | 6.4 | 63 | Lesmahago ditto | 2.5 | 19 |
| London gases (4 company's in 1853) | 5.0 | 47 | | | |

FRANKLAND, *Artificial Illumination*, lecture at Royal Institution, 20 May 1853, in *ATHENÆUM Journal*, 1853, p. 747-8. The damage by heat and other causes to leather, and other articles, is noted *s. v.* GAS, (effects of). GAS BURNER. 14.

The commission appointed to consider the subject of *Lighting Picture Galleries by gas light*, reported, that there was nothing innate in coal gas rendering its application to the illumination of picture galleries objectionable. Its light, though not so white as that of the sun, is equally harmless: its radiant heat may be rendered innocuous by placing a sufficient distance between the gas jets and the pictures; while the heat of combustion may be rendered eminently serviceable in promoting ventilation. Coal gas may be free from sulphuretted hydrogen compounds, and was so in London at that time (1859); it then has little or no direct action on pictures. But it has not as yet been cleansed from sulphide of carbon, which on combustion yields sulphuric acid gas capable of producing 22½ grains of sulphuric acid per 100 cubic feet of (the then) London coal gas. It is not safe to permit this product of the combustion to come in contact with pictures, painted either in oil or water colour; and the commission were emphatically of opinion that in every system of permanent gas lighting for picture or sculpture galleries, provision should be made for the effectual exclusion or withdrawal of the products of combustion from the chambers containing the works of art.

"Certain colour tests, consisting of surfaces covered with white lead, or with vegetable and mineral colours (especially the more fugitive ones), and in which also boiled linseed oil, magylyp, and copal varnishes were employed as vehicles, had been prepared; they were, when dry, covered one fourth with mastic varnish, one fourth with glass, one fourth with both mastic varnish and glass, and one fourth left uncovered. Sixteen of these have been placed for nearly two years in different situations, in some of which gas has been used, in others not. They give no indications respecting the action of coal gas, but seven of them show signs of chemical change in the whites, due either to a town atmosphere or want of ventilation." *BUILDER Journal*, 1859, xvii, 507, which describes the injuries to each specimen.

It was Professor Faraday, who first suggested the means of removing entirely the products of combustion from the apartment, and who contrived the effective ventilating burner, by means of which all the products of combustion are conveyed at once into the open air, but nearly the whole of the heat is in

like manner prevented from communicating itself to the atmosphere of the room. The only obstacles to the universal adoption of this burner are its expense, and the difficulty of conveying the ventilating tube safely into the nearest flue without injuring the appearance of the room. A diagram of it is given in the *ILLUSTRATED LONDON NEWS Journal*, x, 309; 347, as applied at the houses of parliament.

LIGHT; BORROWED (Fr. *faux jour*). The name given to that light, which is admitted to a room by an opening, which does not communicate directly with the external air.

LIGHT; BULL'S EYE. A round light of glass, properly a double convex lens, but now usually flat above, and convex beneath, *i. e.* having the section of a plano-convex lens. It is often placed upright, or let flush into a floor, or pavement, to afford light to basement rooms, cellars, etc. When placed in a floor to give a borrowed light, its best effect will be obtained by fixing it under a skylight, so that a direct downward light will pass through both of them.

A. A.

LIGHT; DISTRIBUTED. Daylight becomes dispersed through the atmosphere in reflected lines of all directions from all quarters; this is distributed daylight, the standard medium of vision, quite irrespective of the mere original direction of the light afforded by the sun. So that in even moderately dull weather, if only equably dull, this diffusion is so complete that all aspects are practically equal in respect of lighting power.

A paper by Sir D. BREWSTER read at a meeting of the Edinburgh Royal Society, 3 December 1866, *On the Lighting of Houses and the Value of Light*, is given in the *BUILDER Journal*, xxiv, 919; it describes in detail the following effective methods of obtaining additional light. In the case of a very narrow street or lane, where the window is set 6 or 8 ins. within the wall, where not a ray of light can fall upon it, if another window be substituted for it and placed flush with the outside, the glass being roughly ground on the outside, "the light from the whole of the visible sky, and from the remotest parts of the opposite wall will be introduced into the apartment, reflected from the innumerable faces or facets, which the rough grinding of the glass has produced. In aid of this method of distributing light, the opposite side of the street or lane should be kept whitewashed with lime, and for the same reason the ceilings and walls of the apartment should be as white as possible." Even "a blind of fine white muslin placed on the outside of a window flush with the wall", effects the same result. As the light from the only window in a mausoleum did not fall upon the objects to be examined, a muslin handkerchief was stretched across it, whereby such a quantity of light was thrown into the crypt as to display fully its contents. At the national picture gallery in Edinburgh, there are certain small rooms lighted from "dark and unseen gashes in the wall, about 2 ft. high and 1 ft. broad, interfering with the symmetry of the western façade." To remedy this defect, it is recommended to "take sheets of thick plate glass the size of the openings and of such a colour, that when one side is roughly ground, it will have the same colour as the free stone. When the openings are filled with these plates having the ground side outwards, the dark gashes will disappear and the apartments be better lighted. This method will enable architects to light the interior of their buildings by invisible windows and thus give to its exterior façade the full æsthetic effect of their design." A comment on the above was made on p. 939; and a reply on p. 961.

LIGHT; FIXED. A light not made to open is thus named, in contradistinction to one hung with pulleys or hinges. A. A.

LIGHT; GREENHOUSE. A light for the upper part or glazed roof of greenhouses, conservatories, etc. The outside stiles and rails should be stout, as the bars supporting the glass are not framed transversely as in most sashes, but run in one length from end to end, so that the pieces of glass, with which they are filled, may be fixed to lap over each other and to carry away the water without check; if these bars are very long a

flat piece of iron may be laid across them on the under side and screwed to each to keep them steady. The light is generally carried on stout wrought rafters either rebated, or with stops; and has lines, pulleys, runners, hooks, etc., by which it may be opened or closed at pleasure. In the best sort of work the back of these rafters is covered with flashings of thin lead. The bars may be molded beneath, but in general are only chamfered. QUADRANT.

A. A.

LIGHT; NATURAL; or DAYLIGHT TO A ROOM. The consideration of the "area of light", which should be admitted into any apartment, in other words, what should be the size of the windows by which it should be lighted, is a constant trouble to the architect. If the opening or openings be designed of too small a size for the purposes, for which they are to be used, it is obvious the rooms will be dark and inconvenient, and the house consequently of less value than it would be had they been larger. On the other hand, if they be too large, the extra quantity of the cooling surface of the glass will render the apartment cold, and uncomfortable, beside which, the privacy of the room will be much diminished. Lord Bacon, when referring to the unusual number and size of the windows of some of the houses of his time, writes "a man might as well live in a lantern." The necessities of the case must be the only guide; thus a shop wants as much window as possible. Some trades, like watchmakers, engravers, etc., want light falling in peculiar ways, and coming from peculiar aspects. A north light, for instance, is much valued for some businesses. All these are considerations, which must be left to the experience and judgment of the architect.

A. A.

"Much of the aptness and convenience of a building depends on the mode that may be adopted of lighting it; and no definite general rules can be laid down for the proportioning of windows to the area they have to light. This obviously must always depend on the purpose of the room to be lighted; much also on the nature of the room through which the light passes, and on the position of the windows; and above all, perhaps, on the degree of intensity of the light obtainable from without. The practice of Italy, for example, would be a very unsafe guide for this more uncertain climate and more sombre atmosphere. Here the most ample panes, and the clearest glass will often hardly suffice, whilst in Italy such is the penetrating fervour of the sun, that sometimes men are content, as at S. Miniato near Florence, with the light that can make its way through slabs of alabaster. Then, again, the light that is obtainable in an open country and in a crowded street requires totally different proportions; whilst a window filled with stained glass will need, in order to afford a given volume of light, an extent of perforated surface that would be altogether disproportionate where clear glass is used"; SMIRKE, *Lecture* at the royal academy, *BUILDER Journal*, 1859, xvii, 133.

"The proportion of light absorbed in its passage through different kinds of glass at different angles of incidence requires careful investigation. Crown, sheet, and polished plate, glass allow almost all the light to pass; rough plate and ground glass, are as transparent, the only additional absorption is owing to irregularity in the refraction of rays at the surfaces, many of them being so refracted into the substance of the glass as to be partially or wholly absorbed. Fluted and embossed glasses of various sorts probably do not, if the flutings be flattish, interrupt the light more than the glass first considered. (CONSERVATORY). In forming any estimate of the light to be derived in any place, variability in the sources of light must not be taken into account, but provision must be made, especially in our climate, for sufficiency under ordinarily unfavourable circumstances. For this reason, a southern aspect must be treated as a northern one, and the zenith as the horizon; though in towns the former is by far the purer source. The hemisphere of sky will, therefore, be considered as an equable source of light"; HESKETH, *On the Admission of Daylight into Buildings*, etc., read at the Royal Institute of British Architects, 17 May 1852; reprinted

in *BUILDER Journal*, x, 364: and CAPES, *Light, its influence on the proper arrangement in the plans of Buildings* (printed in the *BUILDER Journal*, 1860, xviii, 182, and in the *BUILDING News Journal*, xi, 236), has also supplied many of the extracts herein.

"Scarcely any rules on the admission of daylight into apartments have been laid down by writers. Such as they are they will be in most instances deceptive, and it will be safer to trust to one's general ideas of sufficiency than to such rules. PALADIO, b. i, ch. 25, has stated that openings should not exceed one fourth, nor be less than one fifth, of the width (? side) of a room, and should be in height two and one sixth the width"; and further adds, "as it is necessary to keep all the windows on the same levels of the same form, I prefer those rooms for determining their measure, of which the length is to the width, as 5 to 3. Thus, when the width of the room is 18 ft. and the length 30; I divide the width into four parts and a half, giving one of these parts to the width of each window; to its height two and one sixth of them; and make all the other windows on the same floor, of the same dimensions. The windows of the second story must be a sixth part less than those below." CHAMBERS, *Civil Architecture*, fol., London, 1791, p. 115, has stated as his practice, that he "generally added the depth and height (we suppose width, adds GWILT) of the rooms on the principal floor together, and taken one eighth part thereof for the width of the window; a rule to which there are few objections: admitting somewhat more light than Palladio's, it is, I apprehend, fitter for our climate than his rule would be." GWILT expresses his dissatisfaction with this rule; and *Encyc.*, § 2748, allows from "his own notion" one superficial foot of glass in a vertical wall, free from obstruction in front, to 100 cubic feet of a square room, if placed centrally in such room; but he also states, that "this rule cannot in many cases satisfy the requirements of an apartment, as respects the quantity of light necessary for its proper illumination."

R. MORRIS, *Lectures on Architecture*, 8vo., London, 1734, directs, "multiply the length and breadth of the room together, and multiply the product by the height, the square root of the sum will be the area or superficial contents in feet of the light required." The principle is also given in *extenso* in GWILT, *Encyc.*, § 2748-53.

"In order to obtain a due proportion of window light, the rule is to find the cubic contents of the room in feet, and to extract the square root, which will give the area in feet of the window or windows required; divide this into as many parts as the room will admit of windows." The rule of Sir W. Chambers will give the width of window; "and there are serious objections to enlarging the apertures beyond what the rule prescribes; the cost of the building is increased, the air in the room is cooled proportionally in winter, and the expenditure of fuel must be augmented in order to maintain a given temperature. Independently of the inconvenience arising from a glare of light (especially where the rooms face the south or west), during summer the rooms are overheated; *Aide Mémoire*, 8vo., London, 1845-52, ii, 174.

The long room at the custom house, where much light is required both for reading and writing, was 190 ft. long, 66 ft. wide, and about 50 ft. high. It was lighted by nine windows 8 ft. 6 ins. by 21 ft., on the south side only, the ratio of light to space being as 1 to 400 nearly, with adequate light. Sir R. Smirke subsequently formed a portico and changed the face of the building, greatly diminishing the size of the windows, in consequence of which a light has been rendered necessary from the roof.

Cambridge, Senate house 100.6 × 42.0 × 32.6, light=1 to 155.

Trinity library 190.0 × 40.0 × 37.3, light=1 to 114.

as given in ANON., *Remarks on plans for the new library at Cambridge*, 8vo., Camb., 1831, p. 71-82; which work contains *Library; proportion of Light to Space; Principles of Lighting Rooms*.

ARCH. PUB. SOC.

| Name of building. | Proportion of area to light surface | Cubic contents. | Actual light or 2.884 area. | Required by Mott's rule. | Required by Gwilt's rule. |
|---|-------------------------------------|-----------------|-----------------------------|--------------------------|---------------------------|
| Pantheon at Rome, exclusive of side chapels | 3.399 to 1 | 1,689,870 | 572 | 1,374 | 18,898 |
| British Museum, reading room | 212 to 1 | 1,176,000 | 5,200 | 1,084 | 11,760 |
| Panopticon, Leicester-sq. | 38.5 to 1 | 500,000 | 1,300 | ... | ... |
| Deduct 25 per cent. for coloured glass | 513 to 1 | ... | ... | 707 | 5,000 |
| Sheepshank gallery, Brompton | 36 to 1 | ... | ... | ... | ... |

CAPES.

NOTE.—Gwilt's rule, however, was not applied by him to horizontal surfaces.

It is a matter of experience, that the greatest quantity of light is obtained for an apartment, when lighted by an horizontal aperture in the ceiling; professor COCKERELL, in his *Lectures* at the royal academy, used to state that a skylight yielded four times the light of a window of the same area. A communication to the *BUILDER Journal*, 1866, xxiv, 920, by E. W. Tarn, gives a formula whereby he shows, that "the illuminating power of the whole surface of a sphere above the angle of 45° is equal to that of the whole surface below 45°, but the areas of the two surfaces are as 293 : 707. Hence it is evident, that very erroneous conclusions will be drawn by supposing the sky's illuminating power to be in exact proportion to its surface, unless we take into account the *part* of the sky-surface referred to." The height of the skylight from the floor is an important element never to be forgotten.

It has been said that the lantern of the exhibition room of the Royal Academy at Somerset house, gave the ratio 1 to 106, and including the space of the lantern itself 1 to 120.

LIGHTFOOT (WILLIAM), noticed in WALPOLE, *Anecdotes*, 8vo., London, edit. 1862, p. 942, is probably the same person as the painter and engraver, and "as an architect, was employed under Sir C. Wren in building the royal exchange": he died in 1671. It was E. JERMAN, however, who designed that building, though Wren was occasionally consulted.

LIGHTHOLDER (THOMAS), designed several of the early buildings and houses at Bath in the latter part of the eighteenth century; and the octagon chapel in Milsom-street, opened 4 Oct. 1767. He also built the stables and made alterations at Burton Constable, in Yorkshire, for W. Constable, esq., before 1779, in which year he is stated to be dead, in WATTS, *Seats*, etc., fol., London, 1779, pl. 12. "T. Lightoler" published *The Gentleman's and Farmer's Architect*, 25 pl., 4to., Lond., 1764.

LIGHTHOUSE (Gr. *pharos*, supposed to be the Egyptian Pi Ra (ph'rah, Pharaoh) the sun; Lat. *pharus*; Ital. *farò*, *lanterna*; Sp. *farò*; Fr. *phare*, *funal*; Ger. *Leuchthurm*). A tower, or other similar building, erected near the sea and intended to display a light at night either to indicate the locality of any important point, or to warn seamen from dangerous rocks, shoals, etc. The design and construction of those standing in the sea itself, have been generally of late years confided to the civil engineer, as also of those on the land, which are constructed of iron. In some cases, as at the North Foreland, Kent, a coast-guard station, with dwellings for officers and men, houses for sheltering boats, and other accommodation, is erected. The best form for such a structure is that of a tall tower, which is ascended by a winding staircase, having at the top a lantern light glazed with strong plate glass, and with ventilators through the roof to carry off the heat of the burning lamps. Means should be provided for hoisting or lowering the lighting apparatus; cellars to contain oil and other stores, dwellings for the attendants, and other arrangements, which must be left to circumstances; but in design the erection should be as unlike as possible to any other lighthouse in the neighbourhood, that one may not be mistaken for another in dull weather, or at night. CEMETERY BEACON; DOVETAIL; LAND MARK. A. A.

In England in 1839 there were thirty lighthouses in the

hands of the Trinity house; in 1858 there were seventy-seven. In the United States in 1856 there were four hundred and seventy-one lighthouses, fire-stations, and barges; *BUILDER Journal*, 1856, xiv, 549: a general account of those in the latter country is given in STEVENSON, *Civil Engineering*, 8vo., Lond., 1838, p. 296.

STONE AND BRICK.

| | | Feet. | |
|--------------|---|-----------------------|---|
| 294-283 B.C. | Alexandria (Sostratus of Cnidus) | 547 or 550 by 150 sq. | { JOSEPHUS, and other writers. PLINY, II. N., xxxvi, 12. |
| 1584-1610 | Cordonan, at the mouth of the Garonne (L. de Foix) | 167 by 50 | { CRESY, <i>Encyc.</i> , 241. |
| 1547 | Genoa | 247 | { ARCHITECT, i, 268; GAUTHIER, <i>Genoa</i> , pl. 2-3. |
| 1817 | Salvora, near Trieste (P. Nobile) | 106 | { ALLOEN, <i>BAUZEITUNG</i> , 1836, i, 16-24, pl. 9. |
| 1824-31 | Trieste (Pertsch) | 119.8 ins. | { Ditto, 1838, pl. 217. |
| 1844 | Moro castle, port of Havana | 158 by 25 | { <i>Journal of Franklin Inst.</i> , Philadelphia; B. v, 587. |
| 1737-9 | Eddystone (J. Smeaton) | 68 by 25 | { A work by J. S., 1793. CRESY, 367-55. |
| 1811 | Bell Rock, near S. Andrew's (J. Rennie or R. Stevenson), cost £61,331 | 115 by 42 | { Work on it, 1824, <i>Surveyor</i> , etc., i, 137; C.E., xii, 77, etc.; xxv, 152, 215. |
| 1839-41 | Skerryvore (A. Stevenson), cost £90,700 | | { Work on it, by A. S., 1848; C.E., xi, 173; 205. I.L.N., iv, 60. |
| 1860 | Hanois at Guernsey (J. Walker, C.E.) | 92 by 17 at top | { B., xviii, 435; 567. |
| 1847 | Hartlepool, Durham (S. Robinson) | 50 | { I.L.N., xi, 301. |
| 1815 | Tuscar rock, Grenore point, co. Wexford (£30,000) | ... | { WARBURTON, <i>Dublin</i> , 1091. |
| 1723-91 | North Foreland | ... | |
| 1848 | South Foreland (two) | ... | { C.E., iv, 402; xi, 319; B., xix, 643. |
| 1864-6 | Wolf Rock, Cornwall | 116 by 40 | { B., xxii, 620. |
| | Cap de Gatteville, near Bardeur | 271 | |
| 1803 | Sunderland (Pickernell), removed 1841 | 62 by 15 | { I.C.E., iii, 342; C.E., iv, 243; 325; 378; viii, 49; CRESY, 335. |
| 1842 | Goodwin Sands (Bush) | ... | { C.E., v, 357, 401. |
| | Menai Straits (Walker and Burges) £12,500 | 75 by 40 | { C.E., v, 318; I.C.E., ii, 122. |
| 1836-9 | Bréhat, Brittany (Reynaud) | 175 by 45 | { C.E., xx, 141; ALL. BAU., 1852, 120-36, pl. 467. |
| | Calais (Reynaud) | 173 by 24 | { ALL. BAU., 1852, pl. 468. |
| 1839-62 | Alguada Reef, Singapore (Capt. Fraser), £100,000 | 163 by 44.5 | { C.E., xxvii, 169. B.N., xi, 64. |
| IRON. | | | |
| 1855-6 | On Great Isaac's Rock, between the islands of Bermuda and the Havana | 140 by 25 diam. | { B., viii, 237; C.E., xviii, 377. |
| 1844 | Island of Bermuda | 130 by 24 | { I.L.N., 1844, iv, 260. |
| 1843 | Arranmore | 85 by 15 | { B., xxi, 635. |
| 1842 | Morant Point, Jamaica (A. Gordon) | 90 by 18.6 | { C.E., iv, 328; 333. |
| 1814 | River Dee, by cylinders | ... | { C.E., vii, 208; 293. |
| 1852 | Bishop's Rock, Scilly Isles (Walker and Burges) | 120 | { C.E., xiii, 42; 108; I.L.N., 1840, xv, 34. |
| 1852 | Gibb's hill, Bermuda (A. Gordon) | 110 | { I.C.E., ix, 182; C.E., xv, 257; xvi, 376; CRESY, 1689. |
| 1856 | Coffin's Patches Reef, Florida | 160 | { C.E., xix, 160. |
| 1846 | Point de Galle, Ceylon (A. Gordon) | 80 by 12.5 | { I.L.N., 1847, x, p. 12. |
| 1855 | Island of Seskar, near Cronstadt | 82 by 20 | { I.L.N., xxxii, 589-90. |
| TIMBER. | | | |
| 1839 | Maplin sands, with Mitchell's patent screw moorings | ... | { C.E., ii, 37; iv, 132; v, 60, 252; xx, 141. NOUVELLES ANNALES, etc., 1855, pl. 50; I.C.E., ii, 150; vii, 146. |

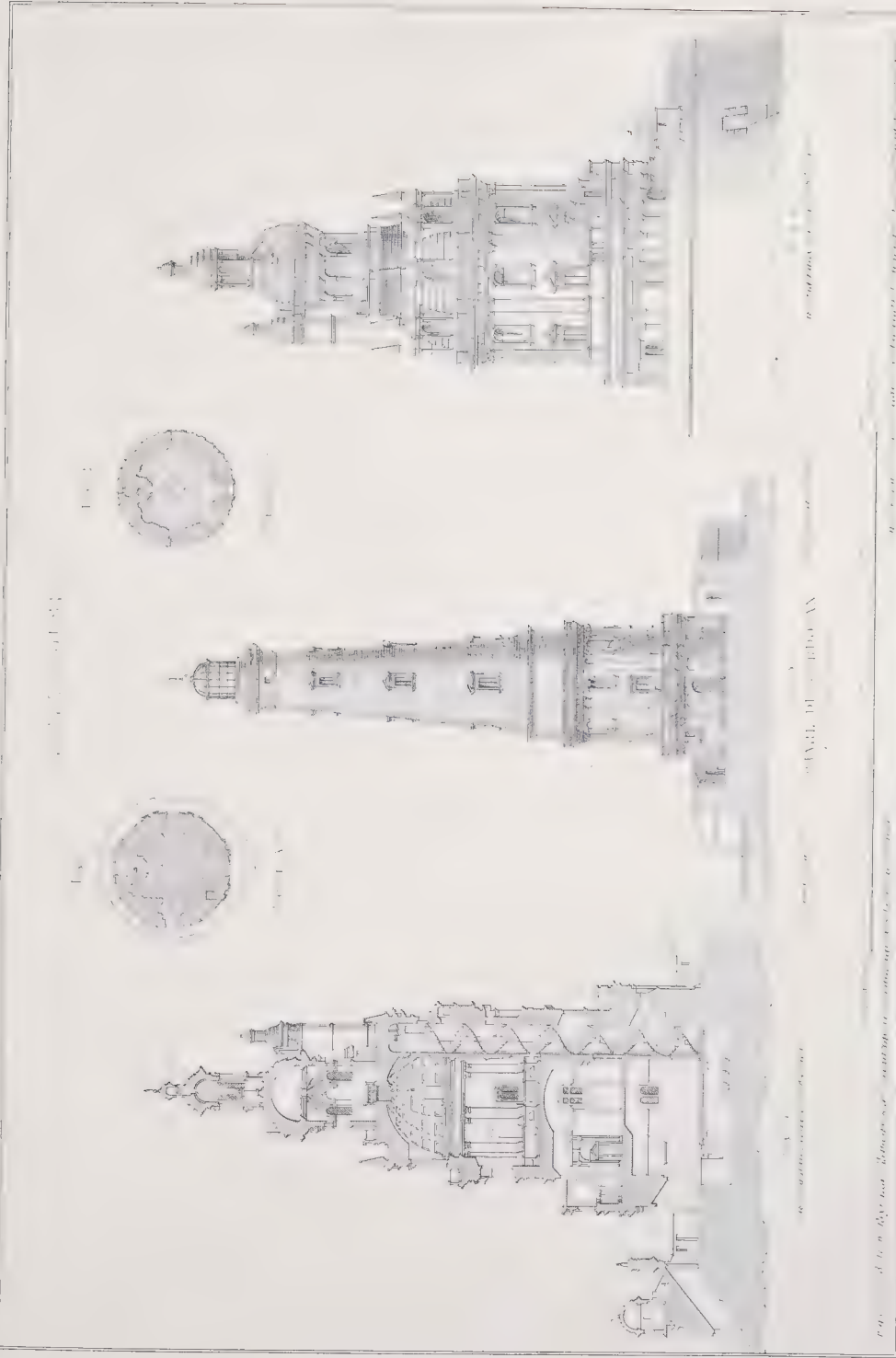
| No. | Height above first centre, Ft. | Contents of tower, Cubic ft. | If diameter at base, at top. |
|----------------------|--------------------------------|------------------------------|------------------------------|
| Eddystone | 68 | 13,343 | 24 15 |
| Bell rock | 100 | 28,530 | 42 10 |
| Skerryvore | 138.5 | 58,580 | 44 15 |

On *History of L.*, C.E., 1849, xii, 247. *BUILDER Journal*, 1858, xvi, 589, the catadioptric light: 1862, xx, 290, in France, the lenticular lantern. T. STEVENSON, *L. Illumination*, 8vo., Edinb., 1859; FINDLAY, at Society of Arts, given in C.E., 1848, xi, 61. On *L. and L. optical apparatus*, in I. L. N., 1851, xviii, 593-4. *New South Shoal L.* (of iron), Nantucket, C.E., xvii, 410-8. *L. lately erected in the Red Sea*, C.E., 1863, xxvi, 366. Four "projets de phares" are given in DALY, *Revue Générale*, 4to., Paris, 1852, x, pl. 9. Capt. SMITH, *Madras L.*; *Report on Apparatus*, etc., in *Papers of Corps of Royal Engineers*, 4to., London, 1842, v, 34. A. STEVENSON, *British Pharos*, etc., 12mo., Lond., 1831; and *Rudimentary Treatise on L.*, 12mo., Lond., 1850. *Annual list of Northern L.*, fol., 1847, etc. D. STEVENSON, *On L.*, from *Good Words Journal*, 8vo., Edinb., 1864. *Report on Lighthouses*, fol., London, 1845. The above abbreviations represent the *ILLUSTRATED LONDON NEWS*; *BUILDER Journal*; *CIVIL ENGINEER*, etc., *Journal*; *Proceedings of the Institution of Civil Engineers*; and the *ALLGEMEINE BAUZEITUNG*, which 1852, p. 127, gives a map of these structures on the whole coasts of France, and p. 134 names the first class works.

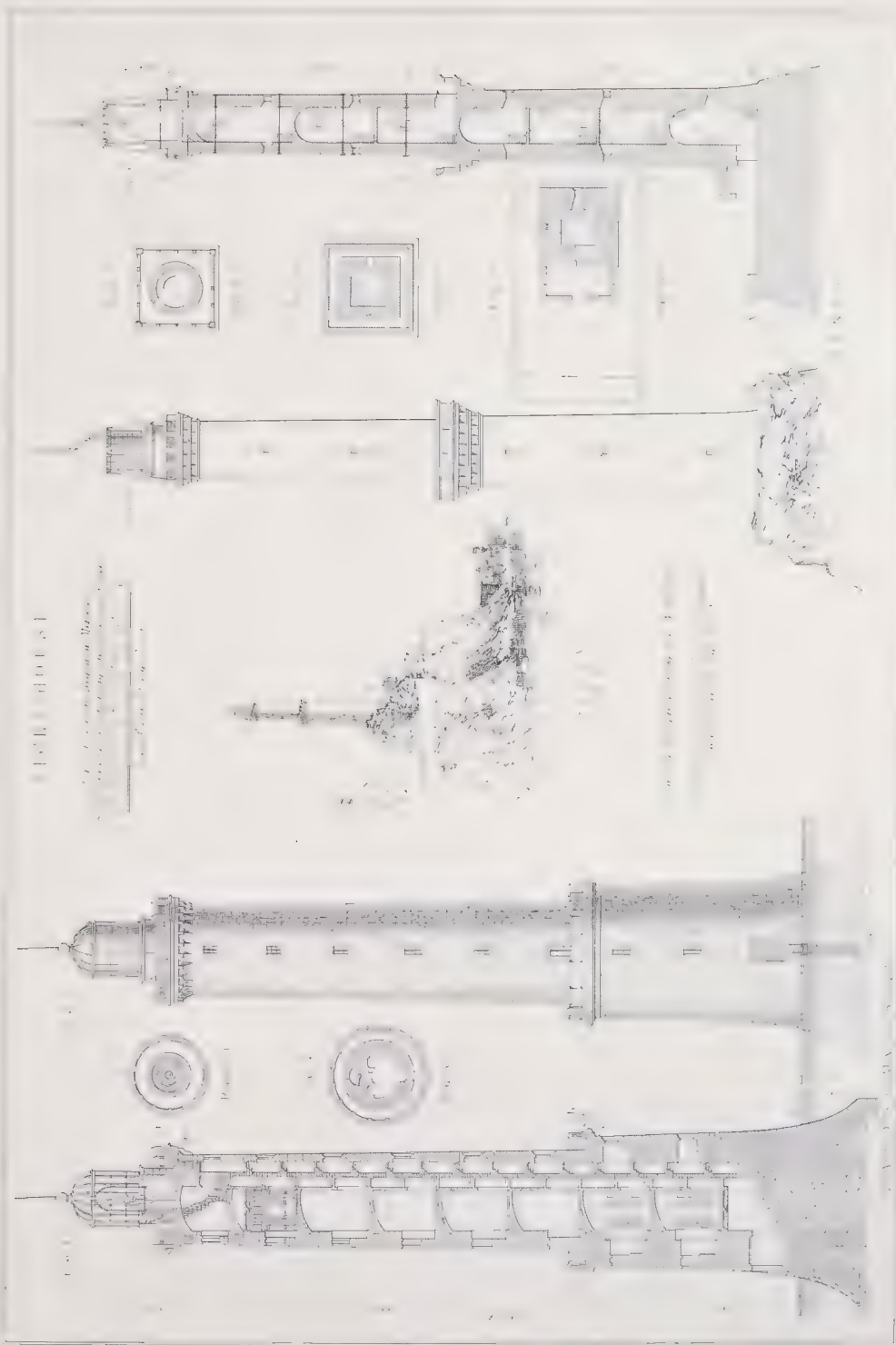
The requirements of a modern edifice of this kind, as the tower, staircase, instrument-room, store-rooms, lodgings of keepers, and room for inspector, are treated at full by REYNAUD, *Mémoire sur l'Éclairage et les Balises des Côtes de France*, 4to., Paris, 1861, p. 159; who gives illustrations of several French lighthouses varying in importance. He observes that a circular plan is the only one to be adopted for a lighthouse in the sea, and is desirable for a very high one on land; but in the second case he thinks that an octagonal plan is generally preferable if the lighthouse is to serve also as a landmark: he notices that the height from the ground to the platform should not be less than 40 ft., which is not always enough, inasmuch as the glass of the lantern at Fécamp, although more than 55 ft. from the ground, is often damaged by bits of stone carried upon the wind.

MONTFAUCON, *L'Antiquité expliquée*, 1719, shows the Roman pharos destroyed 1644 by the degradation of the rock on which it stood near Boulogne in France. Vestiges of a corresponding building have been found at Dover in England. No lighthouse belonging to the middle ages is mentioned by REYNAUD: but VIOLETT LE DUC, *Dict.*, s. v. Tour, pp. 182-7, notices the watch-towers, which served as beacons, to be seen in the vicinity of Aigues-Mortes; the majority were executed, according to him, under Louis IX (1226-70), Philip III (1270-85), and Charles VI (1380-1422): he specifies the round tour de Constance, at Aigues-Mortes, 72 ft. diameter and 95 ft. high, with a beacon-turret 36 ft. high; the square tower of the fort of St. Jean, belonging to the fourteenth century, on the left of the old harbour at Marseille, which has lost its beacon-tower; and the tour de la Lanterne, dating about 1375, on the ramparts at La Rochelle, where it now serves as a landmark: of this he gives three plans with an elevation and a section, showing a round tower about 52 ft. 6 ins. in diameter and 72 ft. high to the alure, from which rise a stone spire 114 ft. high and an octagonal turret about 93 ft. high for the light, but placed against one of the land faces of the octagonal spire.

In the opinion of REYNAUD there were no important lighthouses built in recent times until the epoch of the Renaissance: he mentions the example constructed in the sixteenth century at Genoa as being still one of the finest edifices of its class: this rises about 206 ft. 6 ins. in two superposed towers, the lower one about 29 ft. 6 ins. and the upper one about 23 ft. square. But the splendour of the ancient lighthouses has never been, and perhaps never will be, rivalled in any modern example except by the tour de Cordonan situated at the mouth of the Gironde, in the département de la Charente-Inférieure in France. The original, and therefore the total, expense is not known of this structure, which was commenced 1584 and completed 1610, with the light about 120 ft. above the highest









tides: besides many repairs and restorations, it received 1786-90 an additional height of 75 ft. 6 ins. designed by l'euilère; but in point of art this was not an improvement upon the design (shown in BELIDOR, *Arch. Hydr.*, fol., Paris, 1753, iv, 160, pl. 18-9) by its architect L. de Foix, whose bust with an inscription placed over the door of the chapel in the second story, is surmounted by a long eulogium, printed in REYNAUD, p. 156, who gives pl. 16-18, a representation of the condition of the work when, after 126,312 francs had been spent in its repairs, it was re-lighted 11 August 1854. He notices, p. 170, pl. 16 and 17, that a free lining of brick was necessary there, as in other places, to the dwellings, because they were damp: pointing, oil-paint, and hydrofuge coats were found weak, or rather powerless, palliatives of the moisture which was attributed (not to condensation but) to the use of sea-sand in the mortar, or to the presence of water blown through the joints. This structure, like several others in France, is disfigured by paint; for about 81° of its circumference from the north eastward has been made red, according to the same author, p. 233, who gives its height above highest tides about 197 ft., but from the rock about 206 ft. The phare des Héaux de Bréhat, in the département des Côtes du Nord, is given in the same work, p. 173-181, pl. 20: after a year's preparation it was erected 1836-9 at a cost of 531,679-28 francs, not including the lantern and its apparatus: the height is said to be about 147 ft. above highest tides, but from the rock about 159 ft.: the relation of the circumstances attending its erection is worthy of being compared with those of the Eddystone and Bell-rock lighthouses.

These three buildings are shown in the *Illustrations*, 1867, part 1.

LIGHTNING CONDUCTOR. An invention, generally believed to have been made by B. Franklin, by means of which buildings and ships are protected from the effects of lightning. The process by which he is said first to have attracted the electric fluid from the cloud, and conveyed it to the earth, are too long for these pages, but may be found in all the chief publications on electricity. The first means employed in forming a practical lightning conductor were simple slender iron rods carried from above the highest part of the building, as directly downwards into the ground as possible, by stays projecting a small distance from the walls. These rods, however, were not found always successful. One of the first improvements suggested was that lightning conductors should be terminated towards the sky by balls, not points; experiments showed this view not to be correct. The point collected as well as the ball and more silently; whereas the latter sometimes threw out serious sparks. It was then found on further investigation that accidents had happened where the conductor in any way was broken or discontinuous. Thus, for example, the old iron rods rusted in the sockets which held them, and where they had parted the lightning had been conducted into the house opposite the fracture instead of down to the ground. It was apparent that those rods were next to useless, which did not go deeply into the earth. It was also discovered that those conductors were most effective that presented the broadest surface. This fact, and the difficulty of making continuous joints without a break, were decidedly against the use of wire rope, and militated somewhat against that of welded copper tube, as its interior is not exposed to the fluid. The success of the electric telegraph then suggested a further protection by the insulator of glass, pottery, or other vitreous or non-electric matter, through which the conductor should be carried. As some conductors, when struck by lightning, had their tops fused, the next improvement was that the conductor should have points, each split into three and tipped with platinum, and that the rest of the apparatus should be made exactly like that of the telegraph. All this perfection, however, is expensive; a much simpler and cheaper system has been suggested and carried out by Mr. A. Ashpitel. A riband of copper about 1½ in. wide is soldered together in lengths, then rolled round so that the

edges do not touch, and that the largest possible surface be exposed to the air. Then, if insulators are not to be had readily, the necks of old wine bottles are taken, and secured to the wall with copper wire and strong nails; these cannot be distinguished from insulators at a distance, and efficiently answer the purpose required. If the conductor cannot be carried into a well or brought into contact with water, a deep hole is dug into which any old refuse metal, as a burnt out gas retort, or an old broken railway wheel, is thrown, and brought into contact with the copper conductor; or it is said that a considerable quantity of charcoal may be better used for this purpose.

A. A.

A body is said to be a good, or a bad, conductor according to the manner in which it allows the passage of electricity; in other words, according to its power of isolating other bodies in a state of electrical excitement. The metals, anthracite, coke, charcoal, pyrites, galena, the peroxide of manganese, are ranked by BECQUEREL, *Traité d'Electricité*, Paris, 1855, amongst the best conductors; and he considered that saline solutions, water, etc., or the human body, might be included in the same category, though in a minor degree. Resins, sulphur, gutta serena, dry glass, silk, cotton, paper, oleaginous liquids, air, or dry gases, are bad conductors at ordinary temperatures: dry freestone when heated, as in hot weather, resists the passage of the electric fluid very strongly. Fig trees and cedars are rarely struck by lightning; also the American or large-leaved variety of the beech, whence the Indians always seek shelter under it; the ancients held the same opinion of the birch; larch, fir, and chesnut are obnoxious to it, also, it is said, the laurel. The trees that attract it most are, oak, yew, and Lombardy poplar; whence it follows that the last are the trees most proper to be placed near a building, since they will act like so many lightning conductors. The electric fluid attacks in preference such trees as are verging to decay by reason of age or disease.

The *BUILDING NEWS Journal*, 1859, v, 135, records that M. Lapostolle of Amiens, found in 1826 that straw was a valuable conductor of electricity; a wisp of straw should be tied to a wooden stake by means of brass wire and a copper point affixed to the top of it. These means had been employed in eighteen communes of the département of Tarbes, one being used for every 60 acres, and it is said that the lands have been protected from lightning and also from hail.

An account of the injury done to Strasburg cathedral 14 August 1833, and 10 July 1843, as related by A. Fargeaud, was translated by C. Walker in the *Electrical Magazine*, and reprinted in the *Polytechnic Review*, 20 January 1844, pl. 34-5; and *BUILDER Journal*, 1844, ii, 39. Many accounts of the damage done to buildings, are given in the GENTLEMAN'S MAGAZINE, *passim*. Murray's conductor is described in ARCHITECT Journal, 1850, ii, 218; and by CHANTRELL, in CIVIL ENGINEER, etc., Journal, 1842, v, 321; which also 357, describes the conductors to St. Paul's cathedral, London. The mode of fixing the conductor to two large chimney stalks in Woolwich dockyard, is described in the *Papers of the Corps of Royal Engineers*, 4to., London, 1847, ix, 74.

Lightning conductors ought to be fixed to every lofty building, and it is on account of the superior conducting power of copper wire that it is used for the purpose. The notice by ARAGO, *Sur le Tonnerre*, inserted in the *Annuaire du Bureau des Longitudes* for 1838 (notes extracted are given in the *BUILDER Journal*, xiv, 301), investigates the action, and gives a statement of the principles which should regulate the construction, of these protectors. It is therein shewn that the best form to be given to the point of a lightning conductor, is that of a sharp rod; that its diameter should not be less than three-eighths of an inch (Faraday preferred $\frac{3}{8}$ even to $\frac{1}{2}$ inch the usual size); that the zone protected by a conductor may be limited by a circle whose radius is equal to twice the clear height of the point above its last bearing; and that the lower

end should be either carried three feet below the surface of the water of a well, or ten feet below the surface of ordinary damp ground. As it would be almost impossible to bend a copper rod of three-eighths of an inch diameter round moldings or other projections of a building, it has been latterly (since about 1812, but it was used at Munich long before 1830) the custom of the best constructors to use copper or brass wire ropes which are fastened to the brickwork by copper staples or bands and gun metal nails; a glass ring is sometimes used. Platinum points were employed at the church of S. Isaac at S. Petersburg.

TOALDUS, *Dei conduttori per preservare gli edifizii da' fulmini*, memorie, 4to., Venezia, 1778, translated by BARBIER DE TINAN, *Mémoires sur les conducteurs*, 8vo., Strasbourg, 1779; GAY-LUSSAC, report to the French government published in *Annales de Chimie*, and in *Annals of Philosophy* for 1824, xxiv; these comprise the best practical instructions for the erection of conductors. WATSON, *Observations upon the effect of L.* (at S. Bride's and South Weald); with an account of the apparatus proposed to prevent its mischief to buildings, 4to., London, 1764; DU MONCEL, *Exposé des applications de l'Electricité*, 8vo., Paris, 1856-7, and his other works; LA RIVE, *Traité de l'Electricité*, 8vo., Paris, 1854-56; transl. by WALKER, 8vo., Lond., 1853, etc.; QUETELET, *Mémoires de l'Académie Royale des Bruxelles*; ARAGO, *Meteorological Essays*; Introduction, by VON HUMBOLDT; translated by SABINE, 8vo., London, 1855; W. S. HARRIS, *Treatise on Lightning Conductors*, compiled by L. LYON, 12mo., London, 1853; and his *Rudimentary Electricity*, 12mo., London, 1848. Some remarks by FARADAY are given in the paper by BUCHANAN, *Chimney of the Edinburgh Gas Works*, read at the Scottish Society of Arts 1850, and printed in the *ARCHITECT Journal*, 1850, ii, 571-2. On *L. Conductors*, in the AIDE-MÉMOIRE, 8vo., London, 1845-52, i, 370. *Die Blitzableitersetzung nach dem Bedürfnisse der Baukundigen*, in the ALLGEMEINE BAUZEITUNG, 1837, ii, 165-84, pl. 125-6. Papers on the effects of lightning at sea and on land, are given in ALL THE YEAR ROUND *Journal*, 1863, ix, 270, 357, 424, 566; and 1868, xx, 274.

LIGNARIUS. A late Latin term frequently occurring in the mediæval documents, with 'lignorum faber', for a carpenter; the term CARPENTARIUS has been translated ARCHITECT when found among the records of the Benedictine order. The term will be found in the inscription given s. v. CORNELIUS.

LIGNUM VITÆ. Guaiacum officinale and G. sanctum are generally considered to furnish this wood, called *hackia*, on the river Demerara, in British Guiana. But this statement is doubted, as the tree producing the wood attains a height of from 50 to 60 ft. and squares 16 to 18 ins. (the log being 2 ft. in diameter), whilst the Guaiacum officinale is described as a comparatively small tree, about 4 to 5 ins. in diameter. Col. Lloyd says that it grows in the isthmus of Darien to the size of 5 or 6 ft., and is there called *guallacan*, and is one of the most abundant trees of the country. It is the *guaiacan* (Fr. *bois lizard*) of Trinidad; and the *guayacan*, *guayacancillo*, of Cuba. The best lignum vitæ is said to come from Bani and Azna in S. Domingo: the heart wood is of a dark brown colour and intensely hard and heavy; BUILDING NEWS *Journal*, 1856, ii, 730. The *Buhama lignum vitæ* has a very large proportion of sapwood, pieces of 8 or 10 ins. diam. have heartwood that scarcely exceeds 1 or 2 ins. diam. It is there chiefly employed for shingles and fastenings for houses situated by the sea-shore, or in the vicinity of salt ponds in the out islands, where, from the quick corrosion of iron, metal hinges, etc., are rarely used. HOLTZAPFEL, *Woods*, etc., 8vo., Lond., 1813, p. 90. 71.

LIGORI (PYRRHO), usually called Pirro, printed PIERO in the English translation of VASARI, and Pirrho Ligorio, was born about 1490 at Naples; MILIZIA and others call him 'nobile del seggio di Porta nuova.' Having entered into the service of his compatriot Paul IV (Caraffa, 1553-9) at Rome, he could not refrain 1556-7 from interfering with the architect of S.

Peter's, and spreading insinuations that M. A. Buonarroti had fallen into second childhood: there seems to be no foundation, beyond this information furnished by VASARI, p. 314, for the statement made by MILIZIA that Ligori was engaged on this fabric at the time, although BONANNI, *Templi Vat. Hist.*, fol., Rome, 1696, p. 89, intimates that Paul IV so employed him. Having obtained the rank of architect to the palace of the Vatican, he executed for Paul IV the chambers behind the pavilion of the Belvedere at the north-western corner of the great cortile (BONANNI, p. 231), and commenced the casino or villa in the wood of the Belvedere: he designed the monument of this patron in S. Peter's by order of Pius IV; according to MILIZIA; but it does not there exist. He designed 1560 the palazzo Lancellotti, at the south end of the piazza Navona for the signori Torres; the elevation is given in FERRERIO, *Palazzi di Roma*, fol., Rome (1655 ?) pl. 36; and DURAND, *Parallèle*, fol., Paris, 1801, pl. 54; and a plan in LETAROUILLY, *Rome Moderne*, fol., Paris, ii, pl. 164, texte 4to., p. 361.

On the accession of Pius IV (1559-66), Ligori retained the post of architect to the Vatican and continued to build (as expressly stated by VASARI, pp. 153, 194, 324) the palazzetto, being the above-mentioned casino, which seems to have been completed 1561 according to the inscriptions thereon: in these Paul IV is not named, and the place has always been known as the villa Pia. The fountain in the oval court was executed from a design by Fiamingo: the decoration of the works has undergone little alteration beyond decay, except that the four figures of satyrs with goat's legs have disappeared from the piers of the nymphaeum. The building has been illustrated in detail by BOUCHET and RAOUL ROCHETTE, *La Villa Pia*, fol., Paris, 1837; and a general notion of it is given in PERCIER and FONTAINE, *Maisons de Plaisance*, fol., Paris, 1824, 2nd edit., and in QUATREMÈRE DE QUINCY, *Vies*, 8vo., Paris, 1830, i, 309. Under this pontiff Ligori obtained 1 September 1564 the appointment yearly worth 900 ducats of joint-architect with G. Barozzi da Vignola to S. Peter's; but VASARI observes with pleasure, p. 332, that Pius V (1566-72) caused the former, who presumptuously proposed changes in Buonarroti's design for the cupola, to be dismissed with little honour to him, so that Barozzi had the sole charge (after 1566, BONANNI, p. 89). The dates are given in FEA, *Notizie intorno Raffaele*, 8vo., Rome, 1822.

Nothing more is known of Ligori until 1568; but, as the villa d'Este at Tivoli was commenced about 1550 by Ippolito d'Este, cardinal of Ferrara, the memoir in BOUCHET supposes that the decoration of one side of the great terrace, the models in relief of ancient edifices in a sort of amphitheatre at one end of that terrace, and the general decoration of the villa, support the conjecture that Ligori was engaged there for some time before he settled 1568 at Ferrara by the invitation of the duke Alfonso II, who gave him a monthly salary of twenty-five gold crowns. For this patron he repaired the buildings which an inundation of the Po had damaged in that city, where he died, apparently without issue by his marriage there, about 1580. His portrait is given in the *Biografia degli Uomini Illustri del regno di Napoli*, 4to., Naples, 1813-22, vii.

His drawings are mentioned in BOUCHET, p. 12-15, (with an apology, for their inaccuracy caused by the hasty manner in which their author gathered his materials), as having been once in the collection of the commendatore Carlo del Pozzo, and as having been seen in one hundred and twenty volumes by Isaac Vossius (about 1638-48), according to the statement by Olivieri in CALOGERA, *Nuova Raccolta*, 12mo., Venice, 1755-84, xix, 470, or better in ORELLI, *Inscriptionum Latinarum Selectarum*, 8vo., Turin, 1828, p. 43-54. It must be noticed that QUATREMÈRE DE QUINCY, p. 314, asserts that about the end of the seventeenth century the nephews of Ligori possessed his numerous drawings, and that his illustrated manuscripts, which they inherited, passed through the libraries of the Ferrarese signori Gardellini and Crispi into the possession of duke Carlo Emma-

nuele I of Savoy (1580-1630) who gave 18,000 ducats for them, being thirty volumes now in the royal library at Turin, besides two more in that at Naples. But the memoir in BOUCHET says that thirty-five volumes of the commendatore's collection exist at Turin; refers to notices in GUDIVUS, *Antiquae Inscriptiones*, fol., Leeuw., 1731, (pref. to App.), of Ligori's works in the Barberini, Farnese, and Ottoboni libraries at Rome; and supposes that the ten volumes at Naples should be considered not as additional but as portions, from the Farnese library, of the copies made for queen Christina of Sweden (abdicated 1654 died 1689) like the twelve in the library of the Vatican, and others in the Barberini library. It is evident that neither of these biographers had compared the volumes at Rome, Naples, and Paris, with any description of those at Turin. Some drawings of ancient remains by Ligori exist in the collection at Windsor. The Bibliothèque Impériale at Paris is supposed to possess two manuscripts by Ligori, dedicated to cardinal Ippolito. One of them, formerly No. 10183, entitled *Descrizione della villa Tiburtina Adriana*, in ninety 4to. pages, appears to have been printed in GRAEVIUS, *Thesaurus Antiquitatum Italiae*, fol., Leyden, 1725, vi, viii; and a second time by F. CONTINI, *Pianta della villa Tiburtina*, fol., Rome, 1751. The other, formerly No. 58 of the collection from S. Germain des Prés, but supposed to have previously been in that of the cardinal d'Estrées, is entitled *Il primo libro delle antichità di Pyrrho Ligori Napolitano, nel quale paradossamente confuta le comune opinione sopra varii et diversi luoghi della città di Roma et fuor di essa*, but it contains books 2, 3, 4, 6 and (partly) 7: perhaps this is printed, partly or entirely, in the work entitled *Delle antichità di Roma, nel quale si tratta de' Circhi, Teatri, ed Anfiteatri, con le paradosse*, Venice, 1553. A fragment in SCHAEFFER, *De Vebiculis Antiquis*, 4to., Frankfurt, 1671, was printed from a copy of the original at Turin, according to the memoir in BOUCHET: this authority also mentions the existence of separate plates of a work by Ligori, viz., a map of Greece; another of the kingdom of Naples; a restoration of the circus Maximus, which is reduced in the edition by Pamelius of TERTULLIAN, *De Spectaculis*, fol., Franc., 1597; and the picture of ancient Rome entitled *Antiquae Urbis Imago a Pyrrho Ligorio*, which occupies twelve plates in GRAEVIUS, *Thesaurus Antiquitatum Romanarum*, fol., Leyden, 1694-99, i. 3. 25. 36. 38.

LILAC WOOD, see SYRINGA.

LILLE (English, Lisle; Italian, Lilla; Flemish and German, Ryssel). The capital, in former times, of French Flanders; but now the chief town of the département du Nord, in France. It is surrounded with walls and regularly fortified, ranking as a fortress of the first class; the citadel, an exact pentagon, is regarded as a masterpiece of Vauban. Two sluggish streams, la Haute and la Basse Deule, are connected by a canal called la moyenne Deule, and the country being very flat can be laid under water for 1½ mile around the walls. It has spacious and regular streets that are lined by large massive houses, two or three stories in height, well built with brick, or with the calcareous stone of the neighbourhood; the cellars, a series of low damp vaults which form the ground story, are let out to the poorer classes, and the consequent diseases have rendered the town proverbially unhealthy; many of the houses were erected during the Spanish rule in the sixteenth century. The esplanade and drill ground near the citadel, forming a promenade, contains a statue of general Négrier killed 25 June 1848 at Paris.

The cathedral, dedicated to Notre Dame de la Treille and S. Pierre, is in course of erection: the design for it was thrown open to competition in 1855; out of the forty-one designs submitted, one by H. Clutton and W. Burges of London obtained the first prize; and one by G. E. Street of London the second (view in *BUILDER Journal*, xvi, 90); the third prize was awarded to J. B. A. Lassus of Paris (*BUILDER Journal*, 1856, xiv, 169, 218); but subsequently the erection was entrusted to — Leroy

of Lille (whose design was tenth on the list and the last to which a medal was awarded), and to — Barthélemy of Rouen: the crypt under the east end was being used for service in 1861. The principal church, dedicated to S. Maurice, and erected about the end of the fifteenth century, is cruciform, with double aisles all of equal height supported by slender and lofty columns: the chapel of the Virgin was restored 1851 by Leroy; and the exterior was being restored 1858-61 by Cannissié: the glass is by Godelet of Lille. The three-aisled church of S. Catherine, having a western tower, is in the Third Pointed style; the chapelle de Persévérance at the west end of the north aisle is by Leroy; in the north chapel is the celebrated image of Notre Dame de la Treille, in whose honour a confraternity was founded in 1254; the glass is by Godelet. The cruciform church of S. Sauveur, also in the Third Pointed style, has three-aisles, with apsidal terminations to the choir and transept, and a western tower, the spire of which was burnt in the siege of 1792. The church of S. Etienne, erected 1747, is a richly decorated Corinthian building: on the vaulting of the chancel are paintings, by C. Hugot of Paris, transferred to the wall by a process invented by his father, a native of Metz; they have all the appearance of fresco; the polychromatic decorations are by Stalaers of Lille. The church called La Madeleine, of a Corinthian order, has a circular body with a concentric aisle round it, from which radiate the choir and corresponding northern and southern chapels. The churches of S. André, and of the Jesuits, are both Italian.

The hôtel de ville, anciently the palais de Rihour, was begun 1410 for Jean sans Peur (ob. 1416) finished 1430; and the greater part was rebuilt 1849-54 by Benignat: there still exist, however, a fine brick tower and gateway of the former period, having the upper part erected 1826 by Chatillon of Paris; the chapel and salle du conclave, built for Philip l'Assuré 1416-66 and painted by A. de Vuez, a native of Oppenois near S. Omer, who died here in 1724; and also a tourelle with a groined staircase with interpenetrating moldings. In the right wing are the musée des tableaux, for which a new gallery was being constructed in 1860; a library possessing 391 manuscripts; and the musée Wicar, consisting of a collection of 1435 drawings mostly by old masters, bequeathed 1834 by the chev. J. B. Wicar, a historical painter, containing 212, chiefly architectural, (8 ins. by 5 ins.) by M. A. Buonarroti (but attributed to G. Vasari, by DONALDSON, in *The Buildings of Lille*, etc., read at the Institute of British Architects, *Sessional Papers*, 14 Nov. 1853; and *BUILDER Journal*, xi, 724-7; and also xix, 625), including the plan and nineteen drawings for the library at Florence. Among the other buildings of importance are the bourse, a quadrangle of brick and stone, erected 1632, restored about 1855-61 by Benignat of Lille; in the centre is a statue of Napoleon I: the hospital of S. John the Baptist founded about 1441 for poor aged females; with its grenier du Miracle and the old hall and refectory: the hospital of S. Sauveur with 451 beds, a late erected building with a Second Pointed chapel now used as the dissecting room: the general hospital founded 1739 for old men and children, a stone building consisting of five quadrangles each six stories high, accommodating 1600 persons: the large granaries at the end of the rue royale: the music hall, one of the finest in France: the theatre, with a colonnade of the Doric order, by M. J. Lequeux (1776-86); who also designed the hôtel des comptes, and the intendance or house of the governor. The mint was rebuilt 1772 by T. F. J. Gombert, who designed many private residences in the town, and converted 1781-91 the Jesuit college into a military hospital, which was considered a magnificent work of its sort. The iron roof truss over the railway station, is given in the *ALLGEMEINE BAUZEITUNG*, fol., Vienna, 1851, pl. 384. 28. 50.

WEALE, *Handbook to Belgium*, etc., Svo., London, 1859; BRUN-LAVAINNE, *Atlas Topographique*, etc., de Lille, fol., Lille, 1830: *Dessins et objets d'art légués par J. B. Wicar*, Svo., Lille, 1856.

LILLEHAMMER. A town near Christiania in Norway, situated at the north-east extremity of lake Mjøsen near the mouth of the river Loughen. It was formerly the seat of a bishopric, and possessed both a cathedral and a monastery, both founded by an Englishman, Nicholas Breakspere, who subsequently became cardinal of Albano, and pope (1154-9) under the title of Hadrian IV. The town was burned by the Swedes in the seventeenth century; it now consists of a timber church, with a small number of tolerably well built and pleasantly grouped houses. LAING, *Norway*, 8vo., Lond., 1836, p. 437. 28. 50.

LILY. The popular name for several plants, some of which are supposed to have been adopted as types in decoration. Much confusion, however, has been caused by alteration of name, by erroneous application of the synonyms of one plant to another, and by rash appropriation of names to conventionalised ornaments: even the plant accepted for a symbol of the Blessed Virgin as Mother seems to have been rather a flowering almond than a lily, in the early representations of the Annunciation, according to the notice in the *ECCLESIOLOGIST Journal*, 1846, v, 209-12. The drooping white cup-shaped flowered lily of the valley, used as the symbol of lowly purity, is the convallaria majalis belonging to the natural order Similacæ.

The natural order Liliacæ includes many plants commonly called lilies, which are not necessary to be herein enumerated. The *L. candidum* (apparently formerly called *L. album hortense*), white lily (Fr. *lis*), grows wild in the vale of Tempe and is reputed to be the *κρίνον* of THEOCRITUS, *Id.*, 23, and of DIOSCORIDES, iii, 106: it is said to be the susanna of the Hebrews, and the flower that formerly was borne in the shield of France but later was symbolical of loyalty to the Bourbon dynasty, by FRANCIS, *Favourites of the Flower Garden*, 12mo., London, 1815, p. 27; from whom p. 53, it would seem that the *giglio* or *fiordaliso* of Florence is not a lily properly so called. He seems, in a perplexed passage, to consider that the derivation of the English name flower-de-luce, from *fleur-de-Louis*, in allusion to the settlement of the shield of France by Louis VII, is incorrect; that it should be accepted as a corruption of *fleur-de-déluce*; and that it is the name of one of the white species of iris, viz., the *iris florentina*, florentine flower-de-luce, which belongs to the natural order Iridæ.

A flower seen in the hands of classic figures has been called a lily; and a similar form in work dating 1050-1100 is usually termed a *FLUR-DE-LIS*. Competent authorities have doubted whether the lilies on the shields of the families of Valois and of Bourbon were copied from a natural type; or, if it were so imitated, whether that plant was not a lily but rather an arum, an iris, or a gladiolus. Thus the lilyed termination of the sceptre seen in the hands of figures of the Blessed Virgin and of royal personages is sometimes said to be the flower of the *arum maculatum* (Fr. *gouet*, *piéd de veau*), belonging to the natural order Aroidæ: but VIOLETTE DE DUC, *Dict.*, s.v. *Flore*, p. 491-7, thinks it was either an arum or an iris, that in some such ornaments the artists combined features belonging to those two plants, and that there is no great distance between the fleur-de-lis of the twelfth century and the iris: the inference is that a fleur-de-lis is not a flower of a lily (Fr. *lis*).

The *anemone* (? *coronaria*), the red-flowered anemone or wind flower, belonging to the natural order Ranunculacæ, is the plant called the lily in the English translation of τὰ κρίνα in S. LUKE, xii, 27, and is the type of the ball-flower ornament, according to the opinion of WIGLEY, *Archæological Studies in Jerusalem*, printed by the Royal Institute of British Architects, *Sessional Papers*, 1855-6, p. 105.

Another difficulty arises from the application of the word lily to the LOTUS, as well as to the *nymphaea alba*, and to the *nenuphar* or *nuphar lutea*, both belonging to the natural order Nymphaeacæ, in which the *Victoria regia* is included.

LILY HOUSE. A hothouse containing one or more tanks of running and rippling warm water, constructed for the special

cultivation of the *Victoria regia*, belonging to the natural order Nymphaeacæ, discovered 1837 in British Guiana by R. H. (afterwards Sir R. H.) Schomburgk. The house at Sion house, Isleworth, is described in WEALE, *Pictorial Handbook of London*, 8vo., 1851, p. (510); that in the botanic gardens in the Regent's-park, p. 492; and that at Kew gardens with a figure of the plant, p. 474-5. A plan and detailed description of the house at Chatsworth, designed by J. (afterwards Sir J.) Paxton, was given in the GARDENER'S CHRONICLE, and subsequently in the CIVIL ENGINEER, etc., *Journal*, 1850, xiii, 324-5: this structure was the type of Paxton's design for the building for the Great Exhibition of the Industry of All Nations, 1851.

LIMA. The capital of Peru in South America: the city was founded 6 January 1534 by Francesco Pizarro, and called Ciudad de los reyes. It is situated on the river Rimac, crossed by a stone bridge, 1638-40 designed by fray Geronimo Villegas, of six arches, rising 37 ft. above the water, and 530 ft. in length (a view in LEVAILLANT, pl. 29). The larger division of the town, on the south or left bank, is enclosed on all sides except the north by a brick wall 18 to 20 ft. high, erected 1585 by Pedro Ramon, a Fleming, having thirty-four bastions and nine gates; it was repaired in 1807 but is again dilapidated; the smaller part, or suburb of S. Lazaro, on the right bank, is backed by hills having only two openings; the whole is about ten miles in circumference. In the central parts, the streets are equidistant, intersecting each other at right angles, and are about 34 ft. wide; most of them run from south-east to north-west, so that the walls might afford shade both morning and afternoon; in general they are badly paved and not very clean; the better streets have footpaths formed of broad flags from England; those lying east and west have each a deep stream of water used as drains running down the centre. The houses generally are of one story only, having no windows towards the street; they are built of adobes with division walls of cane covered with plaster, the roofs are of coarse linen cloth or cane, as there is no rain: the house of Péricole is given in LEVAILLANT, pl. 31; and pl. 32 the aqueduct taking the water thereto. The plaza mayor is 510 ft. square, having in the centre a stone fountain of three basins, with a bronze statue of Fame, erected 1650 by Antonio Rivas; the houses on the west and south sides of the square are built above a colonnade, piazza, or *portale* having shops, and well paved with small stones and the knuckle bones of sheep, making a sort of inlaid pavement. On the north side, the palace and offices of the government (the casa real was designed by F. Becerra about 1584), much injured in the great earthquake of 20 Oct. 1687 but restored, are disfigured by shops on the ground floor in front: on the east side are the archbishop's palace, remarkable for its height; and the cathedral; and on the west, the *cabildo* or senate house (formerly the *casa consistorial*), the city jail, and a row of shabby houses. The next public square is the *plazuela de la Inquisition*, now *Independencia*, in which stand the university; and the palace of the Inquisition, now used for the sittings of the republican council of state; the hall is remarkable for the elaborate carving of the oaken roof. A statue of Columbus, in white marble, by Ravelli of Genoa, was to be placed in this square in 1857. The buildings are in the Renaissance style mixed with a Moorish feeling, altered by vast repairs consequent on the great earthquakes of 1630, of 20 Oct. 1687, and of 1746 or 1747, which destroyed three-fourths of the city. The churches have mostly two towers joined by a façade surmounted by a pediment or gable end: the decorations are in stucco, often of a complicated character, stone being seldom used; the whole is covered with a many coloured wash of striking hue; *BUILDER Journal*, 1853, xi, 734.

The cathedral is dedicated to Nuestra Señora de la Asuncion; the first stone was laid by Pizarro, 18 January 1534, but the continuation or design is attributed 1581-5 to F. Becerra; it was not consecrated until 19 October 1625, a view is given in LEVAILLANT, pl. 27; the towers at the angles are of lath and

plaster, and the exterior is painted red and yellow; the interior is generally considered to be "exceedingly beautiful"; the remains of Pizarro are deposited beneath the great altar. The convent of S. Francisco, founded 1536, is the largest in Lima, occupying nearly seven acres of ground, but is much out of repair; it has a fine church and cloisters (a view in LEVAILLANT, pl. 28). Amongst the other churches and convents of note are S. Domingo, S. Pedro (painted red), S. Iazaro, and la Merced, which latter, with that of S. Agustin, have conspicuous single towers (the convent of Sta. Clara is given in LEVAILLANT, pl. 30); but besides the cathedral there are five other parish churches, twelve attached to convents, thirteen to monasteries, and twenty-two chapels; five other convents and monasteries having been suppressed. The university, founded 28 August 1821, was the first established seat of education in the new world; it has a national library (1841) of 26,344 volumes, and 432 manuscripts; a museum of Peruvian antiquities, etc. There are also many schools and several hospitals; two theatres, one dating about 1662; a bull ring capable of accommodating 10,000 to 12,000 spectators; a good amphitheatre for cock fights; a tennis court, etc.

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ULLOA, by ADAMS, *Voyage to S. America*, 8vo., London, 1772, 3rd. edit., 29-46, gives a plan; HELMS, *Travels*, 8vo., London, 1806, p. 260; STEVENS, *Travels in S. America*, 8vo., London, 1825; LEVAILLANT, *Voyage autour du Monde, Album*, fol., Paris (1845); TSCHUDI, by ROSS, *Peru*, 8vo., London, 1847, p. 59-88; MARKHAM, *Capital of Peru*, etc., 8vo., Lond., 1856, p. 283. An account of some ruins of cities and tumuli near Lima, is given in BUILDER *Journal*, 1846, iv, 615.

LIMAYLE, (Fr. *limaille*). The Anglo-Norman word for filings of any metal.

LIMBURG, (Fr. LIMBOURG). A very old city in the province of Nassau in Belgium, situated on the river Lahn, which is crossed by an old bridge. It now consists of the town proper, surrounded by walls, and of three suburbs; and is full of the wrecks of fine old houses. The cathedral dedicated to S. George is placed on an elevated site overlooking the river. It dates 1190-1210, or the west front 1213-42, according to OTTE. It has two square western towers, two tall turrets at each transept, and a tall octagonal central tower and spire, the other towers being completed with stunted spires and gables. It is 168-8 English feet long; width of nave 25-6 ft.; of the aisle 17-5 ft.; length of nave 85-10 ft.; its height 69 ft. The height of the towers to the top of the cross is 179 ft. It contains several monuments of the princes of Nassau. A *männerchor* between the arches and under the triforium, according to the usual Romanesque arrangement, affords a fourth stage, so characteristic of the early churches of the Isle de France. BARNARD, *Nassau and the River Lahn*, etc., fol., Lond., (1840). Eighteen plates of plans and details are given in MÖLLER, *Denkmäler*, fol., Leipzig, 1821; text by LEEDS, 8vo., Lond., 1836, p. 115-27. WHEWELL, *Notes*, etc., 8vo., Lond., 1835, p. 25, characterises this building as "a very admirable specimen of the transition or early German style." SEDDON, *Rambles in the Rhine Provinces*, 4to., Lond., 1868, p. 110, gives the plan, the old richly carved font, and two photographic views. Three other churches; an ancient palace of the bishop; a mint, a superior school, and a theological seminary, complete the public buildings.

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This church must not be confounded with that at Limburg on the Haardt, which is about double the size, and is given in GEIER and GOERTZ, *Denkmale Romanischer Baukunst am Rhein*, fol., Frankfurt, 1846-7.

LIME or QUICKLIME (Gr. *κωλία*, *κύψος*; Lat. *calx*; Ital. *calce*; Sp. *cal*; Fr. *chaux*; Germ. *kalk*). A very important building material, the basis from which mortar, plaster, stucco, concrete, and the greater part of the artificial cements are made; it is also a component part of asphaltes, bitumens, etc. Its use may be traced to the remotest antiquity; "untempered mortar" is mentioned in the Scriptures; and an analysis

of that used by the Egyptians is given in CRESY, *Euryc. of Civil Engineering*, p. 717. It would exceed the limits of this work to record its frequent mention by the ancient writers, and by those of the period of the revival, as ALBERTI, SCAMOZZI, and others, down to the present day. Suffice it to say that the practical use of lime has varied very little since its earliest record. It is otherwise with the scientific discoveries on the subject.

The basis of all lime is now found to be a metal called CALCIUM, which, like its kindred substances such as potassium and sodium, is never found in a state of nature. It abounds, however, in the form of carbonates and sub-carbonates, some nearly pure, some mixed with silice, alumina, magnesia, iron, and other mineral substances; but what is called lime, which is a protoxide of calcium, can only be obtained by calcination. The chief materials, which afford lime, are the chalk strata so abundant in England, and the limestones of every kind, varying from marble to lias. It is also to be obtained from a large number of natural objects, among which the shells of fish, eggshells of birds, and bones of animals may be named; all of these are highly alkaline. After calcination and before it is used, water is thrown over it, converting it into a hydrate, which is not only alkaline but of a highly caustic character. The phenomena of hissing and crackling, and other processes of deflagration, are well known. Lime vitrifies at a great heat but does not fuse readily; although its presence conduces in a very important degree to the fusion of many of the metals, especially iron.

Lime is now generally classified under two heads, non-hydraulic and hydraulic, and there are two sub-divisions of each class, the rich and poor limes, and the hydraulic and eminently hydraulic. The reasons of this classification are, that the former will not set under water, and are unfit for engineering purposes, but the latter will do so to a greater or less extent. The *rich* limes are those which increase remarkably in bulk while slacking; they are excellent when used in dry situations, but where they are in contact with running water they will be entirely taken up, or in other words washed away from between the bricks, etc. These limes are obtained from calcareous substances, which do not contain more than about 5 per cent. of silice or other foreign matter. The *poor* limes are those which swell very little, if at all, while slacking, and contain about 20 per cent. of foreign matters; these also are washed away by running water, but not so rapidly as the rich limes. HYDRAULIC LIME has been the subject of another article. CHALK LIME.

All calcareous substances must be brought to a red heat to get rid of the carbonic acid, and kept at that heat until the operation is complete; this treatment experience alone can teach. If it be not effected, the lime will not slack perfectly; and if the burning be carried too far, vitrification sets in and the same failure occurs. That the burning may be more readily and equably effected, the chalk or stone is generally broken into pieces so small, that the fire may afford its fair effect throughout the whole substance. When the pieces are too large, the heat cannot penetrate further than the outer coat, and so leaves an imperfectly burnt portion in the middle, which will not slack and which workmen call a "core." Lime burners often throw over the pieces of stone, water, which seems, according to some, to combine with the proto-carbonates, so that both pass off in steam; but chemists are not agreed on this theory, and several others have been proposed. It is not desirable, however, that the pieces should be too small, because, if the lime be not used directly, the air would have a very large amount of surface to act upon, and slacking, with waste, would ensue.

Lime is burnt in two sorts of kilns. In one, the calcareous matter is mixed with coal, coke, or coal ashes; and, drawn up in baskets, is thrown in from the top. This sort of kiln is in the form of a tall truncated cone, having at the bottom another very flat cone on which the lime rests, and off which it is

A A

easily drawn by long irons as soon as it is judged to have been thoroughly burnt, four or more circular holes being left through the kiln for the purpose, in a line with the upper part of the cone. The draft can also be easily regulated there. As the material is drawn out, fresh limestone and fuel are supplied at the top. The lime and fuel at the bottom occupy a larger space, and therefore at that spot is a greater bulk of heated matter; besides this it has been longer subjected to the action of the fire in descending from the top, and practice teaches when to cause the lime to "run" out of the holes, and when to supply fresh material. From this circumstance this kiln is called "a running kiln:" it is very convenient, as it may be kept alive and running for almost any length of time; but there ought to be a tolerably regular draft or there will be waste. The other, or furnace kiln, has been described *s. v.* Kiln. It does not differ from a pottery kiln; in fact, in the country, it is a very common practice after burning off a kiln full of bricks to burn another of lime, and so on as the works proceed and either material may be wanted. In many places, also, such a kiln is called a "flare kiln", because the calcination is produced by the direct action of the flame of wood or coals; some manufacturers prefer the intense red heat of coke as it is more regular and does not run itself to slag as coal often does. The exact forms of the kiln, furnaces, arches, and fire doors, vary infinitely: the general principles having been before given, it is only needful here to add, that a kiln should never be made square on plan, as the fire never works properly in the corners. The greater part of what is called "stone lime" is burnt in these furnace kilns, as it is supposed to keep better than that burnt in a running kiln: but observation tends to show that if thoroughly burnt, so as to prevent core, and used at a proper time, the hydrate of calcium from the same material is much the same in whatever kiln it may have been burnt. The 'hot blast' system was suggested 1848, and 1863 (*BUILDER Journal*, xxi, 694), and has been lately (1868) introduced to remedy the standing defect of over or underburnt limes.

To form a proper judgment as to rich and poor limes must be matter of experience. Colour is a very bad test. In this country a grey colour is preferred; in France, a yellowish colour. The best and purest chalk limes in England are nearly white. The least presence of iron will give a yellowish reddish hue. The best test perhaps is lightness, which shows that the carbonates have been thoroughly expelled; more than half the weight being said frequently to be thrown off by burning. Some workmen like to hear lime rattle under the shovel, but this is no proof that vitrification may not exist. The best way of testing it is to slack about a quarter of a bushel in a common bricklayer's basket; if a rich lime it will decrepitate, send off a quantity of steam, with a crackling noise, and become a white powder much increased in bulk in a very short time. The residuum should then be examined for any unslacked portions or core, and then thoroughly chafed up with water until it is like a thick "fine-stuff:" small blocks of brickwork should then be made with it, from which a judgment as to its goodness may be formed. The names assigned to limes are no guide, as there are good and bad strata in all quarries, as well as skilful and unskilful burners.

A. A.

Lime, or rather quicklime, is used as a deodorizer. The General Board of Health ordered that it should be laid to a depth of three inches over the disused churchyards of London, with a view to counteract any offensive odours arising therefrom. It is also recommended to be laid over the earth under the lower floor of houses where the ground has not been excavated, in order to kill any vegetable growth. The "lime process" employed for deodorising sewage, is noticed in *BUILDER Journal*, xv, 292, 590, 628; and xvi, 184-5.

"As nothing is a greater enemy to timber than lime, 'tis best to lay the ends of girders in loam," writes LANGLEY, *Masonry*, fol., London, 1736, p. 354, and all the old authors

on building operations. It is a practice, however, not followed in the present day, for a reason given *s. v.* Bedding timber.

The best publications are noticed *s. v.* Cement. C. H. SMITH, *Something about a Hod of Mortar*, in the *BUILDER Journal*, 1865, xxiii, 22 and 40. ABERTHAW LIME; ATMOSPHERIC INFLUENCE; BÉTON; BLUE LIAS LIME; CALCIUM; CEMENT; CHALK LIME; CONCRETE; CONTACT; CORE; DORKING LIME; GREY STONE LIME; HYDRATE; HYDRAULIC LIME; HYDROGEN; KILN; MORTAR; PUTTY; SCOTT'S CEMENT; SLACKING; STONE LIME.

LIME FOR FRESCO PAINTING. The selection of the lime intended as a ground for fresco painting is a matter of great importance. The qualities of the limes of Great Britain have been questioned as to their fitness for fresco painting, but it is satisfactorily shown that a material is obtained even superior to any other yet known to have been used in the preparation of grounds. This is the limestone procurable from the quarries on DURHAM DOWN, near Bristol (*BUILDING NEWS Journal*, 1864, xi, 744); the lime from which was used in the frescos of the new palace at Westminster; its analysis yields

| | |
|-----------------------------|------|
| Carbonate of lime | 99.5 |
| Bicuminous matter | 0.3 |
| Earthy matter | 0.2 |
| | 100 |

A fresco by Mr. Cave Thomas, for which this lime was used after careful preparation, was exposed for upwards of twenty years to all the effects of the external atmosphere, and showed no symptom of flaking or deterioration of colour; as noticed in the *ATHENÆUM Journal*, March 28, 1863, p. 466.

The limestone used by all the great artists who painted in Rome in the beginning of the sixteenth century was travertine. It is recommended by VASARI, and was probably used for this purpose by the ancients; it is almost a pure carbonate of lime, being composed of

| | |
|--|------|
| Carbonate of lime | 99.4 |
| Alumina, with a trace of oxide of iron | .6 |
| | 100 |

During the best period of Italian art the lime of Genoa was highly esteemed and remarkable for its whiteness; its composition is

| | |
|--|-----|
| Carbonate of lime | 63 |
| Carbonate of magnesia | 36 |
| Earthy matter, oxide of iron and bituminous matter | 1 |
| | 100 |

Although the purest lime has always been sought and recommended, it is yet shown that impurity to a certain amount is not injurious to the work. The reduction of the causticity of the lime is an important object in its preparation for fresco; this depends in a great degree upon the length of time elapsing from the period of its being slacked to that of its use. The effect, of its being employed too soon after it is slacked is, that it blisters. With respect to the length of time necessary to subdue this causticity, authorities vary: some considering it unnecessary to keep it longer than a few months; others insist on its being kept for three years at least before it is used for the pigment or intonaco. The lime for the frescos in the Ludwig kirche at Munich was slacked eight years before it was used. It would be desirable to learn in how short a time it may be employed with perfect safety. Some degree of causticity is, however, indispensable to give adhesive firmness, and to render it fit for the purpose of the fresco painter; because to this certain degree of causticity it is indebted for the quality of induration which is exerted on exposure to air in a moist state. *First Report of the Royal Commissioners on the Fine Arts*, fol., Lond., 1842, p. 41; W. CAVE THOMAS, *On Mural Painting*, 8vo., Lond., 1869. FRESCO; MORTAR.

W. C. T.

LIME FOR MAKING MORTAR OR FOR LIMEWASH. LIME

which has been suffered to slack by the moisture of the atmosphere returns (owing to its imbibing carbonic acid), after a time, to the state of unburnt lime. If made up into mortar to be kept in a heap, it undergoes, though more slowly, the same change; and when not quite destroyed, is found to have lost much of its binding quality, by the mixture of the outer dead part of the mass with the lime in the interior of the mass. All these evils may be avoided by the German process of preparing lime so as to preserve it for a long time, always ready for mortar or whitewash. Dig a pit in the earth about 7 or 8 ft. long and 4 or 5 ft. broad: by this pit set a wooden trough about 6 ft. long, 2 ft. broad, and 1 ft. deep. At one end of this trough cut a hole about 6 ins. square, before which nail a grating of iron with the bars about a quarter of an inch asunder; and inside the trough a slider to the grating is to be placed so as to be occasionally drawn up. Put two or three bushels of freshly burnt lime at a time into the trough; throw plenty of water on it, and mix it well up with a large hoe perforated with holes. When there is a good quantity of liquid, draw up the slider, and let it run into the pit. The trough should have a small inclination, and hang six or eight inches over the pit. Throw more water on the remaining limestones; those which will not slack are not sufficiently burnt and may be taken out. After the lime thus slacked has been a few hours in the pit, it will take the consistence of paste, which it will preserve for years. It should be kept covered, to keep it clean, and to exclude the fixed air floating in the atmosphere, as well as to preserve it from heat or cold, especially the latter, as frost destroys it. For those who use large quantities, several pits should be dug in preference to larger ones. This lime, mixed with water, is very superior to whitening for whitewash; and, as it requires no size, is much more wholesome, as the nauseous effluvia from size, which always attracts damp, is disagreeable. It gives a resplendent white for ceilings, and has a peculiar tenacity on walls, and in situations exposed to wet. It has the advantage of always being ready for use; for when mixed with a little water and a proper proportion of sand, mortar is prepared in a few minutes. This lime is equally good after lying several years in the pit. Any one acquainted with this method of treating lime, and the process usual in England in preparing mortar, will not hesitate in giving this method the decided preference: *MECHANIC'S MAGAZINE*, 1823, i, 70, where the writer seems ignorant that this is, in effect, a traditional process, as noted *s. v.* *Intrita*, and that it was observed, by plasterers at least, in England, even at the time he was writing.

LIME. This material was formerly sold by the BAG, then by the HUNDRED, and now by the BUSHEL. A TRAY and a SEME were terms also used about the sixteenth century. In many parts of Scotland, the "boll" is used. In Perthshire 6 bolls equal a ton, or a single horse cart load; one ton and a half should be used for each standard rood of masonry of 36 square yards, 2 ft. thick: the quantity by weight should not vary. A chaldron of lime is about 3½ tons. Fulwell or Barrow lime is sold by the quarter, eight of which make a ton and a half. Old or slacked lime increases one-quarter in bulk; *LANGLEY, London Prices*, 8vo., Lond., 1750, p. 378.

The general weights of lime are per bushel;

| | In the stone. | When ground. |
|--|----------------|--------------|
| Plymouth stone lime | 70 lb. | ... |
| Blue lias (Lyme Regis) | 70-75 lb. | 70-74 lb. |
| Blue lias (Keynsham) | 80 lb. | 63 lb. |
| Superior blue lias (Cardiff) | ... | 85 lb. |
| Portland cement | 99-108-110 lb. | ... |
| Roman Cement | ... | 72-77 lb. |

LIME AND HAIR, see PLASTER.

LIME ASH FLOOR, see PLASTER FLOOR.

LIMEN. A Latin word, which seems to be connected with the Gr. *λίμνη*, the Lat. *limus*, the Fr. *lime*, and the Eng. *limit* and *sublime*: it is usually translated "a lintel or threshold, an entrance, and a house" (or rather a home): as well as "a goal, a station, a limit, or a frontier;" this last group will be con-

sidered *s. v.* **LIMES**. The use of the word *limen*, for the head and the sill of a doorway, seems to indicate that its application to them was as poetical as to the entry: it occurs in *PLAUTUS, Mercator*, v, i, who says "*limen superum inferumque salve*"; a similar expression occurs in the *Fragments* of *NÆVIUS*; and it is not easy to say which is meant in *JUVENAL*, vi, 226, "*pendentia linquit vela domus et adhuc virides in limine lauros*." The word might be supposed not to be technical, as *CATO, De Re Rustici*, uses *jugumentum* for a lintel; and as, even in a modified form, it only appears once in *VITRUVIUS*, who, iv, 6, uses *supercilium* for the head of an architrave, but vi, 4, speaking of the *alæ* of an *atrium* says "*trabes carum liminares ita altæ ponuntur ut altitudines latitudinibus sint æquales*," where in spite of the context, the word *liminare* has been translated 'belonging to a threshold': it occurs, however, in the *MARMOR PUTEOLANUM*, which specifies that a "*limen robustum*" 8 ft. in length, is to carry mutules over a doorway. It is curious that *sublimen* was taken by *SCALIGER* for a lintel. **SUPERLIMINARE.**

LIME PLASTER. An invention patented 12 Aug. 1862 by C. M. Westmacott, for making a composition, by which lime is combined with unburnt limestone or chalk suitably ground or reduced to powder. The proportions may be varied; but when using very good lime, it is preferred to use at the rate of two measures of unburnt chalk or limestone to one measure of lime. This compound may be employed alone, or combined with sand, plaster of Paris, clay, or other materials, according to the circumstances under which it is to be used. *KERR, On Artificial Stone*, in *Sessional Papers* of the Royal Institute of British Architects, 1862-63, p. 148; 152-3.

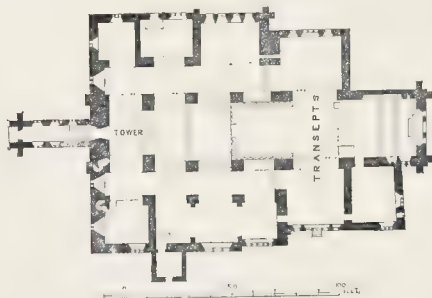
LIME PUTTY. A mortar formed of lime reduced to the consistence of thick cream, and sifted, used for setting rubbed bricks so as to make fine joints; *LANGLEY, London Prices*, 8vo., London, 1750, p. 132: the bricks are dipped into it to take up a coating and then driven close upon each other when being set. Ashlar work is usually set in a putty formed of lime, white lead, and a small quantity of fine sand. 1.

LIMERICK (Lat. *Regia Altera*; Irish, *Luimneach*). The capital of the county of the same name in Ireland, situated on the river Shannon, over which are six bridges; Park bridge, old, and consisting of five irregular arches; New bridge, built 1761-2 by Uzuld or Usulle, a Dutchman, having three large semicircular arches, the centre one 41 ft. span, and 40 ft. in width, at a cost of £1,800; and Bael's, Ball's, or Bawl's (perhaps Boyle's) bridge 1831 by J. and G. R. Pain, of one arch, at a cost of £600, replacing that called Tide bridge; all three are over the abbey stream: Wellesley bridge 1824-31 across the harbour, by A. Nimmo, C.E., with five elliptic arches each 70 ft. span, at a cost of £60,000, £85,000, £89,061, or £142,000, according to various writers; Thomond bridge 1839-43 by Messrs. Pain at a cost of £9,000 or £12,600; and Athlunkard bridge, about a mile distant, by Messrs. Pain, with five large elliptic arches. The harbour is about 4,800 ft. long and 450 ft. wide, with from 2 to 9 ft. depth at low water, and 19 ft. at spring tides; the new docks opened 1853 are by J. Long, C.E., and cost £54,000. Thomond castle, which still retains the gateway and seven massive drum, or circular, towers, is said to have been built 1210 by king John, together with the old bridge of the same name; views of both these structures are given in *CROKER*, p. 40. The walls of the city were nearly wholly removed cir. 1760. There is a statue to D. O'Connell; a column to Lord Montague; and a statue to Viscount Fitzgibbon, who fell in the charge of Balaklava in the Crimea.

The city consists of three portions; the old or English town occupies the southern end of King's island, a tract of land formed by the division of the river, and contains many of the public buildings, and the most ancient houses, which were erected in the Flemish fashion; having been deserted by the wealthier classes, it is now decaying: the new or Irish town lies to the south-east of the stream (both were comprised in the portion fortified after the time of king Edward II); it has wider streets

with more modern houses: and the suburb of Newtown Perry or Newton Pery, which occupies elevated ground to the south of the stream and parallel with the river, formed after 1769, and now reckoned one of the best modern towns in Ireland: it has a good square, and broad, clean, and well paved streets intersecting each other at right angles, lined with good brick houses, shops, and stores. There is railway communication with Cork and Dublin. The city is the seat of a bishopric founded 550, and united 1663 with Ardferit and Aghadoe.

The cathedral dedicated to S. Mary was founded cir. 1194 and erected chiefly in the thirteenth century. It consists of a nave and chancel or choir without any division, the roof being continuous; a western engaged tower, battlemented; north and south aisles and transepts with a large north chapel; side chapels of late date, thus forming a five aisled church; a west porch, with a south one of modern erection; and a chapter house, blocking up a group of long narrow lights in the south wall of the chancel. The details throughout are simple; the nave consisting merely of massive piers with shafts at the angles and one member continued round the arch; over the nave arcade is a clearstory of small lights. The stalls of the fifteenth century occupy the eastern bay of the nave. The north and south windows of the choir are early second Pointed of two lights without cusping, divided by a large pier; in the head is a cinquefoil; there is a bold triplet at the west end of tower; the windows of the north and south gables of the transepts are triplets, cusped, with a lancet window on each side. It was restored since 1858 by W. Slater of London, who has furnished the annexed plan and the following internal dimensions; nave



and chancel 124 ft., and with the tower 145 ft., long, 25 ft. 6 ins. wide, and 54 ft. high; tower 15 ft. long, 21 ft. wide, and 120 ft. high; aisles 78 ft. long and 11 ft. wide; chapels about 21 ft. deep, making a total width of 103 ft. and 85 ft. in the transepts, which are 27 ft. 6 ins. wide. There are several good tombs of late date. The other churches consist of, S. Munchin's said to have been the former cathedral, rebuilt 1827, with a lofty tower with battlements and pinnacles; S. Michael's, rebuilt about 1860; and S. John's (Italian) designed 1843 by — Welland at a cost of £1,500. The Roman Catholic edifices consist of, the cathedral of S. John (first erected 1753) designed 1856-60 by P. C. Hardwick of London; the plan and view are given in the *BUILDING NEWS JOURNAL*, 1857, iii, 236, showing a total length of 168 ft., a width of 74 ft., a tower 200 ft. high and 37 ft. 6 ins. square; £11,000 had been spent in 1859; *BUILDER JOURNAL*, xv, 156; xvii, 782: with the churches of S. Munchin built 1744; S. Mary 1749; S. Michael 1779-81, enlarged 1805; the convent of the Dominicans 1815, its church (early Gothic) building 1863, 90 ft. by 60 ft.; and the Redemptorist convent 1856, and church 1858, of S. Alphonsus (Continental Gothic) by P. C. Hardwick, 173 ft. 6 ins. long, 70 ft. wide in the nave and aisles, and 85 ft. high to the top of the cross; the high altar designed 1865 by G. Goldie of London, is given in the same *JOURNAL*, xxiii, 660. There are other chapels and meeting houses belonging to various denominations.

The principal civic buildings are; the custom house 1769, by C. Colles from a design by D. Dukart, engineer, costing £8,000; the chamber of commerce 1805; the exchange 1778 by Henry Denmead; the city court house 1763-4; the county court house 1808-10, costing £12,000; the city prison 1795; the county jail 1817-21 by James Pain, costing £25,000; the assembly house 1770, costing £4,000; the theatre 1841 by J. Fogerty; the savings' bank by — Owen; the linen hall; the corn and butter markets on site of the castle 1697; the Protestant orphan hall designed 1855-59 by W. Fogerty costing £2,000, or £4,100, given in *BUILDER JOURNAL*, 1856, xiv, 27; the Barrington hospital or infirmary founded 1829-31; several hospitals, among which the fever and lock hospital 1781, was rebuilt 1787; the lunatic asylum 1824-26 by Johnson and Murray, costing £29,856; the national model schools 1853-55, costing £3,500; and four large barracks.

At Munget, three miles distant, was a monastic foundation of which the psalter of Cashel gives an almost incredible account, "that it had within its walls six churches, containing 1500 religious exclusive of scholars," CROKER, *Researches*, 4to., Lond., 1824, p. 49-54. The remains of the abbey in 1826 consisted of the walls of a church, the east end of which is 47 ft. long and 15 ft. wide, with a plain window; a small arch communicates with the nave, which is 33 ft. wide and 28 ft. long, having a porch on the north side; the west end is 12 ft. by 22 ft., at the north angle of which is a small square tower with ruined battlements. A ruin at some distance is supposed to have belonged to the abbey: no tombs remain; FITZGERALD, ii, 623.

ARCHDALL, *Monasticon Hibernicum*, 4to., London, 1786, p. 426; FITZGERALD and MACGREGOR, *History of L.*, 8vo., Dublin, 1826-7, with a plan; LAWSON, *Gazetteer*, 8vo., Edinburgh, 1842; FRASER, *Handbook*, 4th edit., 8vo., Dublin, 1854, p. 134, with a plan; WALCOTT, *Caths. of the United Kingdom*, 8vo., London, 1860; LACY, *Sights and Scenes in our Fatherland*, 8vo., London, 1863, p. 576-93; *Handbook for Travellers*, 8vo., London (Murray), 1866, p. 307; DUBLIN *BUILDER JOURNAL*, 1859, i, 17; ii, 178; 378; 633. 14. 28. 50.

LIMERICK MARBLE. A material, considered to be almost imperishable, obtained at the Ballysimon quarries near Limerick. In 1839 the free use of them was offered by M. John Staunton to the government, for erecting the new houses of parliament. It is a hard black marble similar to that of Kilkenny; from its excessive cost (three times that of Portland stone) from its dampness (*i.e.* condensation on the surface), and from other reasons, the offer was declined; SURVEYOR, ENGINEER, etc., *JOURNAL*, 4to., Lond., 1840, i, 9-11; 64-5; the price at which the stone could then be worked was appended. It was used at the new bridge and in many of the buildings in Limerick; and by Sir C. Wren for the steps to the western portico (and perhaps to the other porticos also) of S. Paul's cathedral, London. A slab 13 ft. by 7 ft. from these quarries, is mentioned in the *CIVIL ENGINEER*, etc., *JOURNAL*, iv, 124.

LIMES. This Latin word is usually translated a bound or limit, a border, a frontier, a boundary, and a landmark; as well as a great roadway, and (doubtfully) a cross path. It certainly is the foundation of the Eng. *limit*; and like most of the meanings given to the Latin *lima* (a file), *limen*, *limare*, and *linus*, appears to have the same origin as the Gr. *λίμνη*, to go aside, to get out of the way, to withdraw, to retire, and to sink or fall. The three slippery parallel ditches which form part of the boundary between Prussia and Russia across wastes would have been equally called *limina* and *limites*; and the ridges between them might serve as by-roads if they had not been allowed to be overgrown by brushwood. The *iter limitare* of the Romans seems to have been a way, 5 ft. in breadth, betwixt the grounds of neighbours.

LIMESTONE (lt. *calcare*; Sp. *cal*; Fr. *calcaire*; Ger. *kalkstein*). A stone, of which lime forms a component part, well suited for the erection of buildings, either in solid walls, or in ashlar work. The term is used in contradistinction

to the primitive rocks, as granite, etc.; the volcanic, as lava, basalt, etc.; and to the sandstones. Almost all limestones are FREESTONES. Limestones may be classed as the *soft*, such as clunch, which is very little harder than chalk; Bath stone; Caen: as the *compact*, such as Portland: as the *hard*, such as Kentish rag; the calp of Ireland: as the *magnesian*, such as Anston; Bolsover moor: and as the *crystalline*, such as marble. ALABASTER; DOLOMITE; LUCULLITE; OOLITE. A. A.

Limestones are either simple carbonates of lime; mixed carbonates of lime and magnesia (magnesian limestones); silicates of lime and magnesia (serpentine); or sulphates of lime (gypsum and alabaster). They are available for special purposes, according to their texture, to the cementing medium in the case of the bedded limestones, and in others to the extent of crystalline action or metamorphosis they have undergone. When semi-crystallised and having a grain too fine to be recognised, they are marbles of the common kind, gypsum, or serpentine, according to their chemical composition; when perfectly crystallised, they are statuary marbles or alabaster; when the grain can be recognised, they are generally freestones; when the grain of the stone is mixed with fragments of shell, they are ragstones or shelly limestones; when the grain is formed by a multitude of round concentric particles like the roe of a fish, they are roe stones or oolites; when the stone is compact, the stratification evident, and the stones split readily, they are flags. To all these varieties local names are attached in different districts. The limestones owe their colour to metallic oxides.

The limestones in common use in England for architectural purposes are of several distinct sorts, the Portland stones, the Bath stones, and many others belonging to the oolites: several semi-marbles of very compact grain derived chiefly from rocks of the carboniferous system: the mixed carbonates of lime and magnesia almost entirely from the Permian rocks on the borders of Derbyshire, Nottinghamshire, and Yorkshire, known as magnesian limestones: and some hard varieties of chalk. Elsewhere, especially in the south of Europe, the cretaceous and tertiary limestones are developed into admirable freestones of exquisite colour, very compact, and almost non-absorbent. In Italy, especially, are found the limestones called *tufa*, or more properly 'calcareous tufa', derived from the exposure of waters containing a large quantity of carbonate of lime; on the evaporation of the water the carbonate of lime is deposited in a form more or less compact, according to the material on which it is thrown down and the slowness of the deposit. In limestone caverns, and in veins in limestone rocks, the irregular drooping pendants or stalactites, the floor called stalagmite, and the lining walls of the veins, are formed in the same way; the floor is often very compact and may be used as a marble: Oriental alabaster is of this sort, and is abundant in Egypt.

Limestones, sandstones, and clays of all kinds have been at one time held in suspension or solution by water. They were for the most part deposited from moving water, though sometimes separated on evaporation, as in the case of calcareous tufa and cavern incrustations and stalactites. This is the case with the carbonates of lime very clearly and certainly, with the sulphates less clearly, and with the double silicates of lime and magnesia, or serpentine, least clearly of all. After the deposit in the sea of mud or sand, brought down by rivers from mountains and various lands, and mixed with the detritus obtained from the disintegration of cliffs, this raw material of rocks remains exposed for a long time to the action of water, by which means a certain mechanical arrangement of particles must take place, according to their relative specific gravity: during this time also, a large quantity of remains of plants and animals cannot fail to have been introduced. In some places the whole mass may consist of corals, of shells, of bones of fishes, of scales, or even of the exuviae of animals: in others fragments only are retained: and in some there will be casts of such objects, the original having become decomposed; or markings and impressions sufficient to prove the existence of organisms, even

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when no actual fragment remains. The next step in the conversion of accumulated heaps of mud and sand into definite strata of stone, is that of consolidation. There are two ways in which this is brought about, one mechanical, the other chemical. Mechanically, wet mud parts with superfluous water, and it is converted into a compact mass by mere continued pressure. There are always foreign substances present, which under favourable circumstances will act as a cement, and the solidification is usually effected by carbonate of lime, aluminous earth, or oxide of iron, held in solution in the water and discharged under chemical action. Occasionally silica, in a dissolved state, answers the same purpose.

The work to be effected requires time: and during this time a process of rearrangement of particles generally takes place; so that in the beds or strata now formed, the impurities and foreign substances are separated from the mass, and accumulated in nodules or layers. Whilst the drying takes place there is always contraction, and thus many fissures and clefts are produced. They are often filled up by crystallised plates of the same material as the mass. In this way are produced certain varieties of limestone, but not those common in England. The English calcareous building materials belong to the oolites, in which the grains themselves, before being cemented together by carbonate of lime, have been curiously formed by numerous concentric coats of much smaller particles. Of these there is a great variety, some being white, compact and heavy, such as Portland; others cream-coloured, soft and light, as Bath; with many of intermediate character and of different value. No two stones from different quarries have precisely the same qualities, inasmuch as the conditions under which stones have been formed cannot have been exactly the same in two parts of a coast line. The oolitic grains are believed to have been formed in water very slightly agitated, enabling each grain to become a centre of solidification.

The magnesian limestones are combinations of carbonate of lime and carbonate of magnesia, more or less crystalline, according to circumstances. When the two carbonates are nearly in equal proportions, and both well crystallised, these stones are eminently compact and fine grained, but owing to their nature and mode of formation this condition is apt to be partial, and in this case the quality of the stone is irregular and uneven, and it weathers badly. The cause of the association of magnesia has not been very clearly made out, nor is it essential to the architect to enter upon this question: it is certainly the result of change after the original deposit, and in so far belongs to metamorphic action; but at what part of the history of the deposit the magnesian element is introduced, is still open to discussion.

Marbles of all sorts are crystalline limestones; many of the coloured varieties are so little changed that their mechanical origin is evident, and they are loaded with organic remains. This is not the case with statuary marble; nor with the white granular marbles extensively distributed in certain localities. These are veins consisting of slowly crystallised material, filling up crevices or fissures made in limestone. They are perfect in proportion to the completeness of the metamorphosis; and the removal of all foreign substances. The higher qualities are thus few in number of deposits, and small in quantity. The inferior qualities are abundant and varied. Serpentine marbles are double silicates of lime and magnesia; they are often extremely beautiful, but owing to the mode in which they have been produced, they are crossed in every direction with threads and streaks and are much cracked: it is very rare that large slabs can be obtained of uniform quality for decorative purposes; or that blocks of length enough are found to serve for columns. The mode of the formation of these rocks is not easy to see, but they have been rendered what they are by change, long subsequent to deposit; ANSTED, *Relations of Geology*, etc., read at the Royal Institute of British Architects, *Sessional Papers*, 1867-68, p. 19-22.

B. A.

The chemical action of the atmosphere produces a change in the entire matter of limestones, and in the cementing substance of the sandstones according to the amount of surface exposed to it. The mechanical action due to atmospheric causes occasions either a removal or a disruption of the exposed particles, the former by means of powerful winds and driving rains, and the latter by the congelation of water forced into or absorbed by the external portions of the stone. These effects are reciprocal, chemical action rendering the stone liable to be more easily affected by mechanical action, which latter, by constantly presenting new surfaces, accelerates the disintegrating effects of the former: *Report of the Commissioners for selecting Stone*, etc., fol., 1845, 2nd edit. **ATMOSPHERIC INFLUENCE; FREE-STONE; RUBBLE MASONRY.** The supposition that the contact of mortars with certain descriptions of stone will give rise to fresh chemical combinations, which will increase the hardness both of the stones and of the mortars within a perceptible distance, will be considered *s.v.* **MORTAR** (Induration of).

The carboniferous or mountain limestones are not much used for buildings of a superior character, or even for ordinary housebuilding, probably on account of their liability to absorb water, and their consequent dampness. The Derbyshire marbles from this formation, however, are much used for interior decoration.

The granite and sandstone of Egypt are found inferior to the limestone (which is generally grey in colour) in one respect, that the latter might remain buried for ages without being corroded by the salts of the earth; a fact with which the natives, from having used it in the substructions of obelisks and other granite monuments, must evidently have been well acquainted; *WILKINSON, Ancient Egyptians*, 8vo., London, 1837, p. 412.

LIME TREE, see **TILIA**.

LIMEWASH or LIMESWHITE. A material used in common work, instead of whitewash, not only to make it look light and clean, but also to purify the air from time to time, in stables, cellars, and other confined places. It is also used for giving a white appearance to outside walls. It is made by slacking lumps of quick lime into clean water, and stirring the mixture till it becomes almost as thick as cream. The old work is scraped, or washed down with a rough brush and water, and the limewash applied in the same manner as **WHITWASH**. The better class of work should be stopped, and twice limewashed. **MISTEMPER.** It is the cheapest of all cleansing processes, and very valuable in a sanitary point of view. **A. A.**

100 yards once limewashed, requires $\frac{1}{2}$ cubic ft. of lime.

ditto twice ditto 2 ditto (*HERST*, p. 208).

Limewashing should not be done upon a surface that has been previously whitewashed, because the new work will acquire a yellowish tinge. The interiors of churches are often stated to have been 'whitewashed' during the early part of the post reformation period; when the process was probably often adopted not to beautify so much as to purify the atmosphere of the building (in lieu of 'incensing', as practised in the previous period), and to present a clean appearance. **BADIGEON; DEODORIZER; LACHORACIC PAINT.**

Lime slacked, made into a thick wash, and laid on before it cools, has been recommended for taking out soot stains from the exterior of flues.

LIMEWATER. It was considered by *HIGGINS, Calcareous Cements*, 8vo., London, 1780, p. 42, that "the quantities of acidulous gas known to be contained in the waters commonly used in making mortar, must greatly debase the lime, which is thus exposed to double its weight of such water; and upon these grounds it would be a considerable improvement in mortar, to use no water in it except what had been previously freed from acidulous gas. This is done in making limewater; and the use of limewater appeared advantageous in another point of view. One seven hundredth part of limewater being lime, --and this lime being introduced in a state of solution, which favours the crystallisation of it between the grains of sand,

assists in cementing them together by the utmost attractive forces of its parts." To make the limewater, he recommends, p. 187, that properly selected lime "be put in a brass wired sieve to the quantity of fourteen pounds; the finer the sieve may be, the better it will be, (it should be finer than will give passage to grains of sand as are less than one thirtieth of an inch in diameter). The lime is to be slacked by plunging it in a butt filled with soft water and raising it out quickly, and suffering it to heat and fume, and by repeating this plunging and raising alternately and agitating the lime, until it be made to pass through the sieve into the water; the part of the lime which does not easily pass through the sieve is to be rejected; fresh portions of the lime are to be thus used, until as many ounces of the lime have passed through the sieve as there are quarts of water in the butt. The water thus impregnated is to stand in the butt closely covered (the coating found on the surface of the water should not be broken, as it assists in excluding the air), until it becomes clear; and through wooden cocks placed at different heights in the butt, the clear liquor may be drawn off for use as fast and as low as the lime subsides. The freer the water is from saline matter, the better will be the limewater made with it. Limewater cannot be kept many days unimpaired in any vessels that are not perfectly air tight. If the liquor be drawn off before it clears, it will contain whitening, which is injurious; and if it be not instantly used after it is drawn limpid from the butt into open vessels, it will grow turbid again, and deposit the lime changed to whitening by the gas absorbed from the air. The calcareous matter, which subsides in the butt, resembles whitening the more nearly as the lime has been more sparingly employed; in the contrary circumstances, it approaches to the nature of lime; and in the intermediate state, it is fit for the common composition of the plasterer's for inside stucco;" (p. 189). **MORTAR.**

Limewater is used by painters to kill the grease upon very dirty work when they will not afford the expense of turpentine; it is simply applied by a brush, and then washed off again with fresh water. The employment of limewater in preventing the growth of fungus in timber, is noticed *s.v.* **DRY ROT**, p. 74. **A. A.**

MALLER, On the Action of Air and Water, etc., upon Iron, etc., read 30 May 1843, at the Institution of Civil Engineers, *Proceedings*, ii, p. 176, states that "based on the known effects of a slightly alkaline solution in preventing corrosion, he proposed limewater to replace bilge water, and thus to prevent internal corrosion in iron ships." *C. H. SMITH, On the Cause and Prevention of Iron Rust*, given in the *BUILDER Journal*, 1864, xxii, 318, notices that limewhiting iron tanks and water pipes is a security against rust; and that as lime has a powerful affinity for oxygen, a lump of it being placed in a case of iron and steel goods will keep them from rusting. The steel ornaments of fire grates are often treated with lime for the same purpose.

LIMEWHITE, see **LIMEWASH**.

LIMIT OF DEVIATION. In cases of railways, canals, roads, and other public works, it is not always possible to lay down an absolute course till the undertaking has commenced: there may be many unforeseen reasons why the intended line should swerve a little to the right or to the left of that originally proposed; or the slope of the sides of a cutting may be made less steep than at first considered necessary. It is therefore usual to lay down on the plans deposited with parliament, boundary lines called the "limit of deviation", within which the power of taking property compulsorily may apply. Otherwise, in case a necessity for deviating should arise, the company are either at the mercy of the vendor or must again apply for further powers, and incur the expense of a new Act. Of course these lines are laid down at the combined discretion of the engineer and of the surveyor. If the limit of deviation be considered unreasonably extensive, the owners may oppose it when the bill is in committee. **A. A.**

LIMNING. The abbreviation of "illuminating", or painting with limewhite mixed with white of egg, size or some gum, and stained with ochre or umber, or similar colours. "Alumnyng" and "lamyd" are terms also found in mediæval records. The term 'limner' was formerly applied to a portrait painter.

LIMNORIA TEREBRANS, see **WORM.**

LIMOGES (the Latin Augustoritum Lemovicum). A city in the department of Haute Vienne, originally the Limousin, in France. The sites of the walls and towers are now formed into boulevards. It is situated on the declivity and top of a hill on the river Vienne, over which are three bridges, that of S. Etienne having eight pointed arches, and that of S. Martial having seven pointed arches; the older one, erected in the thirteenth century, is shown in DIDRON, *Annales Archæologiques*, 1847, vii, 17. Outside the east end of the cathedral is a Roman milliarium, and near it a well of some sanctity. The amphitheatre (now destroyed) to the west of the town, is described in DE CAUMONT, *Cours d'Antiquités*, 8vo., Paris, 1838, iii, 477-9, as 449 ft. 6 ins. long by 370 ft. 9 ins. wide, with sixty-four archways to the extensive gallery. The streets of the city are irregular, narrow, and tortuous, and almost all the houses are of timber, at least above the first floor; a few ancient ones remain, although a fire in 1864 destroyed a hundred houses; these had not been rebuilt in 1866.

The cathedral, dedicated to S. Etienne, had a Romanesque predecessor so much smaller, that the existing crypt of its chevet reaches only to half the length of the present sanctuary. The present edifice, built of granite, was commenced 1272 with the choir; the upper part of the apse belongs to the style *ogival primaire*, the windows and vaulting to the style *ogival secondaire*; the jubé at the west end dates 1513; there are only two bays to the nave; and an eastern chapel to the north transept; the bell tower was strengthened and heightened in the thirteenth and fourteenth centuries, over a porch built in the eleventh century, probably about the same time as the present Romanesque vestiges of the west end of the nave, which abut against it. The works were resumed at the end of the fifteenth century, including the north front and portal with carved doors (1510) and rose window, but they were abandoned about 1515. There are three good tombs of the fourteenth and sixteenth centuries. The plan is given by VIOLET LE DUC, *Dict.*, s. v. Cathédrale, p. 374, who supposes it to have been designed by the same architect who was employed to erect that at Clermont in Auvergne (if not also that at Narbonne), as they are alike in plan, system of construction, profiles, and details of ornament; but the nave of that at Clermont has received one complete bay more than that at Limoges. A plan of the tower is also given by him s. v. Clocher, p. 297. The aisles are roofed with large slabs of stones upon which the masons lined out their working drawings; DIDRON, 1846, vi, 140. Of the nine churches may be noticed the Pointed one 1364 of S. Michel des Lions, so called from the granite lions at the chief portal placed there 1286; it is remarkable for the lightness and height of its eight pillars, and for its tall tower and spire: and that of S. Pierre du Queyroix, with a good spire, and a very fine stained glass window, of the date of about the fifteenth century.

The bishop's palace 1787 of granite, is the best modern edifice of the town, which possesses also a royal college; a university; a museum in the old palais de justice; a public library containing 12,000 volumes; a theatre; barracks; hospitals; and numerous manufactories. ALLOU, *Monumens de la Haute Vienne*, 4to., Paris, 1821: TRIPON, *Hist. Mon. du province de L.* 14. 28. 50. 96.

An account of the painted enamels for which this city has been renowned since the twelfth century, is given by A. W. FRANKS, in ROBINSON, *Catalogue of the Loan Exhibition at South Kensington*, pt. 2, 1862; and extracted in the *BUILDER Journal*, xx, 643. Good specimens are deposited in the musée and in the sacristy in the city.

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LIMONUM, the ancient name of POITIERS, in France.

LIMPIAS (FRANCISCO DE) was one of three architects, who presented 22 January 1530 designs in competition with D. de Riaña, for the chapter house and two sacristies of the cathedral at Seville. 66.

LIMYRA. An ancient town situated on the river Limyrus, in the southern part of Lycia. The ruins, above Cape Fincks, were discovered by BEAUFORT, *Karamania*, 8vo., Lond., 1817. The late C. R. Cockerell communicated 195 ft. as the dimension of the exterior diameter of the theatre, to LEAKE, *Asia Minor*, 8vo., London, 1824, p. 328; who, p. 187, notices that some of the sepulchres and inscriptions by the same authority, are given in WALPOLE, *Travels*, 4to., London, 1820, ii, 524. Hundreds of tombs cut in the rock, with Lycian and Greek inscriptions having the letters alternately red and blue, or green, yellow, and red; a long wall with towers; the theatre; etc., are mentioned with illustrations in the long notice given in FELLOWS, *Account of Discoveries*, 8vo., Lond., 1841, p. 205; who, *Journal of an Excursion*, 8vo., Lond., 1839, p. 214, had minutely described the theatre, temples, and walls. 23.

LINCOLN (the Roman Lindum). The county town of Lincolnshire, in England. It is situated on the slope and summit of a steep brow rising two hundred feet above the river Witham, over which is the High bridge, circa 1330 to 1400, having one arch 21 ft. 9 ins. span and 11 ft. high, with two arches on the eastern side: the Gowts bridge 1813 by W. Hayward, is so named after the drains or sluices of the river. The town is indifferently built, particularly the upper part, which consists of irregularly formed streets; but in the lower part many recent improvements have been effected, and several good houses erected. The whole is paved, lighted with gas, and well supplied with water; the conduit of S. Mary le Wigford dates just before 1540 (LELAND, i, p. 34), and appears to have been constructed out of the materials of a previous chapel of fifteenth century date. The Great Northern railway (the hotel is by H. Goddard); the Midland railway 1846; and the Manchester, Sheffield and Lincoln railway, have stations.

There is still an unusual number of ancient remains to be seen in all parts of the city. The Roman remains are numerous and important. The so called 'mint' wall, a side of a public edifice near Newport gate, is a vast angular fragment full 30 ft. high, 70 ft. long, and 3 ft. 6 ins. thick, of stone and brick, each of the latter being 17 ins. long, 11 ins. wide, and 2 ins. thick. Newport, or the northern, gate over Ermine-street, (a Roman roadway thirty-five miles to the river Humber, now used for seventeen miles, 111 ft. wide,) is the most perfect Roman gateway in Great Britain; it is a mass 72 ft. 6 ins. long, 37 ft. 6 ins. high, and 39 ft. deep; the centre arch is 16 ft. wide, 22 ft. 6 ins. high, about 11 feet being buried; the work is composed of twenty-six large stones of coarse texture, with a joint (not a key stone) in the centre; and on each side of the arch are seven courses of horizontal stones, some of them six or seven feet long; one of the side arches, 7 ft. 6 ins. wide and 15 ft. high, is buried to the impost; the other is walled up: ARCHÆOLOGIA, vi, 261; xii, 180, pl. 42; PICTORIAL HISTORY OF ENGLAND, i, 116. Much of the north wall of the Roman city still exists; it was 1300 ft. long, the above named gate being in the centre; near it is a large fragment of concrete rubble work with courses of flattish stone placed on edge and slantwise. The west gate was discovered 19 feet below the walls of the castle, April 1836: GENTLEMAN'S MAGAZINE, new series, v, 583. Traces of a later wall prove that the city was very early extended down to the bank of the river. A plan of a Roman sudatorium with its hypocaust, discovered 1782, 17 ft. below ground, near the King's Arms yard, is given in CAMDEN, *Britannia*, edit. Gough, fol., London, 1789, ii, 257: a similar one, found 1739 near the west end of the cathedral, is engraved in the *VETUSTA MONUMENTA*. A long extent of a Roman sewer was cleared out a few years since.

The castle, the interior of which covers six and a-half acres of land, was built 1068 by king William I, in the Roman quarter; the lower part of the east gate dating 1300 remains, and covers the original archway: the keep or donjon is still of some height: the west gate or sallyport exists; a tower called Cobb's hall, of the end of the thirteenth century, resembles a similar one at Windsor castle; it has two vaulted stories, the lower one was used for a prison, the rings still remain in the walls, and has two outward doors into the moat: the castle walls are from 17 ft. to 22 ft. high to the platform at the battlements, and 9 ft. thick at the top; the foundations have been found in some places to lie far above the moat and to rest on nothing but soil and loose rubble, consequently the earthen mounds at the base are necessary to preserve the walls, which consist of stones laid in irregular courses, filled in with grouted mortar. The keep and walls were restored circa 1845 by E. J. Willson. A plan is given in *ARCHÆOLOGIA*, vi, 264, pl. 30; and a gateway of the castle, 330, pl. 51-5: it is also illustrated in detail in *CAMDEN*, ii, pl. 6.

On the eastern side of the High-street is a building called John of Gaunt's stables, formerly "Sweep's", or "Malt", house", showing valuable remains of early Norman work; it is now presumed to have been S. Mary's guild; a doorway is given in *PUGIN, Specimens*, i, pl. 4. This and the following buildings are described and illustrated in *TURNER and PARKER, Domestic Architecture*, 8vo., Oxford, 1851-5, 40-42: a plain panelled timber front to a house, of the fifteenth century, near S. Mary le Wigford, iii, 229: the Cantilupe chantry house, close to the bishop's palace, about 1366, is shown, ii, 239: and a curious recess in the priory in the close near the walls, ii, 241. The house of John of Gaunt, duke of Lancaster (1362-98) is on the west side of the High-street; BUCK gives a view of it made in 1727 when it was more extensive: in the present kitchen is a large Gothic window; and under the south gable visible from the street, is a semi-octagon oriel of small size; it has been engraved in *PUGIN, Specimens of Gothic Architecture*, 4to., London, 1822, i, pl. 42-3. Near here, is a fragment of a brick house, a rich example of the early part of the seventeenth century, the front is modernised. The "Jew's house", on the west side of the "steep hill", is an interesting specimen of the domestic architecture of the twelfth century; a representation is given in the *PICTORIAL HISTORY OF ENGLAND*, i, 626; and details are in *PUGIN, Specimens*, i, pl. 1. Another Norman house in a less perfect condition remains a short distance higher up on the east side. The "stone bow" or guildhall, temp. 13 Richard II (1389-90), across the High-street, is a fine gateway; the upper part is of the end of the sixteenth century. The principal vestiges of the old bishop's palace near the south side of the cathedral, consist of the ruins of the great hall, about 85 ft. long and 58 ft. wide divided into three aisles, begun by S. Hugh and completed by bishop Hugh, with the tower and some parts added by bishop Alnwick 1436; it is described by *WILLSON* in the *Archæological Journal*, as are also some of the following buildings. (The bishop's present palace is a modern building situated at Riseholme, one and a half miles distant). The vicar's court and stables date partly in the reign of Edward I, and partly 1436-50, *PUGIN, Specimens*, i, pl. 59: the priests' houses in the vicar's college are pure examples of the Geometrical period, the entrance gate and parts near it are late in the fourteenth century: the deanery was rebuilt 1847-48; a fireplace of the thirteenth century is given in *TURNER and PARKER, Dom. Arch.*, ii, 89: the chancellor's house 1480 is opposite the east end of the cathedral; it is an early instance of brickwork, but the "coved" course under the eaves is destroyed; the gateway and oriel of the fifteenth century are given in *PUGIN*, pl. 45, 58. The fine exchequer gate now fitted up as the office of the registrar of the diocese, Potter gate, a postern, an embattled looped tower in Winnowsty-lane, and parts of the walls of the minster close remain, and are of the time of king Edward I and II (1272-1327).

The cathedral dedicated to S. Mary, well situated on an eminence, is one of the finest of the English examples. It is chiefly built in the form of a double or Lorraine cross, and is unusually full of features; it is partly of the eleventh century, but as a design is a complete work of the twelfth and thirteenth centuries exhibiting three or four phases of the Early English style with later additions; the eminent French architect Viollet le Duc has testified to the complete English character of the early portions erected by S. Hugh. The original west front, erected by bishop Remigius of Fécamp soon after the translation of the see from Dorchester, about 1073, still remains comparatively entire; he is said by *GIRALDUS CAMBRENSIS* "to have followed the plan of Rouen cathedral in everything": he died on the 7th, the day (some writers say four days) before its consecration, 8th May 1092. The sculptures, engraved in *CAMDEN*, ii, pl. 8, were described by *TROLOPE* at the Lincoln Diocesan Architectural Society, as printed in *ASSOCIATED SOCIETIES, Reports and Papers*, viii, 279; and partly in the *BUILDER Journal*, 1866, xxv, 149. In 1123 or 1124 the building was greatly injured by fire, after which the nave was vaulted by bishop Alexander (1123-48), who probably inserted the three west doorways within the recesses. It was again partly burnt in 1141; on being restored "it fell short of no church in England of that day". In 1185 it is said to have been "clef" from top to bottom by an earthquake (*BENEDICT* of Peterborough). Bishop Hugh of Avalon or of Grenoble (1186-1200) or Saint Hugh, commenced the rebuilding, Godfrey de Noiers being his architect; the greatly extended new choir (the first five bays eastward are their work) and the chapel of S. John Baptist on the north side, were certainly erected before the bishop's death 16th November 1200; he also added the eastern transepts; the east side of the great transept (the north end of which retains its original composition throughout) with its chapels; and the west side as high as the second tier of windows; the great wheel window (an almost unique example of plate tracery) is probably of his time: he is also said to have built the lower part of the central tower; and perhaps the lower part of the chapter house. The east end of S. Hugh's work alone is destroyed. A characteristic pier crocketed within the shafts, is noticeable in each of the lesser transepts, they are similar to those in the west front of Wells cathedral, which are a few years later. The double arcades reaching partly into the larger transepts, are worthy of attention, as also the varied plan of the arch piers. A valuable section and plans of the south transept by F. C. *PENROSE* are given in the *SURVEYOR, ENGINEER*, etc., *Journal*, 4to., Lond., 1841, p. 107. The completion of the great transepts, which follows in succession, with different profiles, was perhaps the work of bishop William of Blois (1203-09): and the Galilee porch, which resembles the upper part added to the south east transept.

The upper portion of the west front, and the nave, are the work of bishop Hugh of Wells (1209-35). The nave has seven bays in lieu of the eight of the Norman church: the two nearest the western towers are of less width than the others: *PENROSE, Inquiry into the System of Proportions which Prevail in the Nave*, printed in the Lincoln volume of the *ARCHÆOLOGICAL INSTITUTE*, considers the work to have been commenced at the east or tower end with the resolution of rebuilding the façade, but at the fifth arch it being determined to retain it, the succeeding bays were lessened to work in: *POOLE* states that "the first bay of the nave aisles next to the tower has obviously been built at a different time from the rest, and that it was so built that it might form part of the stay of the tower, left without adequate support until the nave, about to be built at the west end, was carried up to it". The two chapels at the end of the nave with external doors in the west front, are part of its design, *i.e.* of the perfected Early English style, as well as the wings and arcades of the west front; the style is also observable in the lantern of the central tower. The two chapels, with the elegant slender Purbeck marble shaft in the centre of the north-

ern (the morning) chapel, and the Norman porphyry font in it, are of the time of bishop S. Hugh.

The fall of the central tower about 1240 (1237 in some writers) destroyed part of the choir; the tower was much strengthened to the top of the roof, and the first stage clear above the roof was built shortly after by bishop Robert Grosstete (1235-53), as is shown by the two peculiarities of the occurrence of knots of foliage at the points of arches and other places where moldings mitre; and the use of a peculiar lozenge-shaped diaper; this latter is found in the pediment of the west front: he is also considered to have built the west transept: he also, or his predecessor, bishop Hugh of Wells, removed the chambers over the south end of the eastern transept, and added several buildings in lieu of them to the south and west of that transept. The chapter house, a decagon in form with a central pillar, cannot date much before the middle of the thirteenth century (*Illustrations*, s. v. Capital, 1856-57, pt. 2; and SHAW, *Encyclopædia of Ornament*, 4to., London, 1842, pl. 9). The presbytery, or "angel choir" (sometimes called the retrochoir) was commenced 1256 (or 1270) by bishop Henry Lexington, who 1255 obtained a license from king Henry III to remove the city wall for the purpose of lengthening the church; it was probably completed about 1282, as the body of S. Hugh (canonized 1220) was removed into it 6 October 1280. The beauty of the carvings, especially of the angels in the spandrels of the triforium arches, causes them to rank among the very best examples of Early English art: the probable meaning of the series has been explained by professor COCKERELL in the volume of the ARCHAEOLOGICAL INSTITUTE. The richly painted scroll-work, medallions, and Lombardic inscriptions on the plastering of the vaulting, were destroyed a few years since when the masonry was exposed to view. The fine south-eastern porch is unique in England as regards position, though frequent in French cathedrals; the restorations, probably by J. Essex, obliterated the remains of the statues and pedestals in the door jambs. The side gables of the east front are simply ornamental, as they do not correspond with the roofing.

Of the cloisters, the work of bishop Sutton (1280-1300), the south side was far advanced in 1296; they are constructed with such lightness that the thrust of a vault of oak ribs and planks forced out the walls, and caused the addition of buttresses; the bosses are of unusually good carving and resemble the stone ones of the presbytery vaulting. The north side with the library over it having been nearly destroyed by fire, was rebuilt by Sir C. Wren about the middle of the seventeenth century.

Bishop John D'Alderby (1299-1320) issued in 1307 letters of indulgence for continuing the central tower, the dean and chapter having in 1306 contracted with Richard de Stowe mason (probably the same that had been employed on the Eleanor crosses) to superintend and employ other masons under him; he contracted to do the plain work by measure and the fine carved work and images by the day (it has been suggested (*Archæologia*, ix, 125.) that this contract refers to the presbytery more than to the tower): there is perhaps not a finer tower in the kingdom; solidity of construction and lightness have been combined by the use of two thin walls with a passage between: the work was probably completed before the end of 1310; the parapet was added about 1775 by J. Essex. The south end of the west transept was greatly altered and the beautiful rose window inserted by bishop Thomas Bek (1342-47). The additions in the Perpendicular period were, the upper part of the two western towers; the panelling and vaulting under them; the centre and side windows within the three recesses of the west front about 1436-49; the interior of the central doorway; and the vaulting of the great tower. The choir screen cir. 1330, has had its chief sculptures destroyed in the Reformation period replaced by diaper work; its rood loft has a good staircase, and a unique 'pulpitum' looking into the choir was preserved as far as possible when the organ was

enlarged in 1824; PUGIN, *Specimens*, i, pl. 30. The well-executed stall work in the choir, cir. 1360, is considered the finest in England for variety and beauty of design with economy of labour in certain details; each canopy is richly vaulted, the ribs well molded are found to be segments of circles turned in the lathe; the bosses are plainly rounded and covered with leaves cast flat in lead, secured by a nail and then turned up and down around the wood core: the 'dark staining' was done about 1848; it was under restoration 1867-68. The wrought iron grilles opposite the lesser transepts are plain but well wrought, and may have been the fence of a shrine.

The sepulchral chapels of bishops Fleming (1420-31), PUGIN, *Specimens*, i, pl. 36; Russell (built 1480-95); and Longland (1521-4), PUGIN, i, pl. 55-6, deserve attention; the first and last chapels were restored 1859. The presbytery contains the tombs of the Cantilupe, and Wymbish, families, having canopies: and those of the Burghersh family; the Lancaster family tomb; and the Tailboy's tomb 15(76), are the rest of interest.

The timber spire of the central or 'broad' tower was blown down 30 January 1547; those on the western towers were taken down 1808: the old pavement with its processional stones in the nave was removed 1782: a lavatory exists in the vestry in the north-east transept: the reredos was designed 1775 by J. Essex: the brass eagle is dated 1667: the bishop's throne is modern: the pulpit, which is moveable, dates from the reign of king James I. The bell "Great Tom of Lincoln" being cracked in 1827, was taken down 1834, and recast into a new bell 6 ft. 10½ ins. outer diameter at the mouth, and 5 tons 8 cwt. weight; it was hung April 1835 in the central tower, and ranked then as the third, but now as the fourth, bell in England; it is said to be the only great bell in England which is (occasionally) swung.

On the north side of the choir is an elaborate tomb divided into two portions, the easternmost being an Easter sepulchre, all of the very best Decorated period. In the cloisters an incised slab dated 13. records R. de GAYNSBURGH a "cementarius"; an elaborately carved slab is supposed to have covered the body of Remigius before it was removed; and there are other ancient carvings: a shed in the garth covers a Roman tessellated pavement discovered 1793 about 12 ft. below the surface; it was engraved by FOWLER of Winterton. The restoration of the west front was commenced March 1860 (LINCOLN STONE). The stained glass 1859 in the west rose window is to the memory of Remigius; *BUILDING NEWS Journal*, v, 822. The pulpit about 25 ft. high 1863-4 by Messrs. Ruddle of Peterborough from a design by G. G. Scott, was to cost about £500.

WILD gives the following dimensions; total interior length 470 ft.; width 80 ft.; nave, 240 ft. long, 80 ft. wide, and 80 ft. high; choir, to the screen 140 ft. long, 40 ft. wide, and 72 ft. high; the presbytery, 116 ft. long, 32 ft. wide, and 72 ft. high; west transept, 220 ft. long, 63 ft. wide, and 74 ft. high; eastern transept, 166 ft. long, (width with chapels 44 ft.), and 72 ft. high; the cloisters are 118 ft. by 91 ft.; the chapter house 60 ft. diameter (and 42 ft. high, having a central stone pillar surrounded by ten Purbeck marble shafts). The entire breadth of the west front is 173 ft., the height to the gable is 83 ft. The two west towers are 180 ft., or 206 ft., high, the former spires were 101 ft. high to top of the vane; the centre tower, 268 ft. 4 ins. high to the vane on the pinnacle, is usually called 300 ft.

The following dimensions, however, are given as correct on the authority of — Espin, of Louth; total interior length 482 ft. length of nave to transept 213 ft.; and to screen 252 ft.; width 44 ft. 4 ins. to centre of pillars; aisles 17 ft. 10 ins.; total width 80 ft.; height of vaulting 80 ft.; length of choir 158 ft.; length from choir to east end 72 ft. The west transepts are 222 ft. long, 66 ft. wide; the east transepts 170 ft. long and 44 ft. wide including the chapels, which are 19 ft. The cloisters are 91 ft. on the east and west sides, and 118 ft. on

the north and south. The width of the west towers 85 ft., the height 180 ft.; the spires 89 ft., ball 5 ft., vane 10 ft., total 101 ft. (said to be 186 ft. to top of the parapet); the height of central tower 270 ft., pinnacles 30 ft., or 300 ft.; width 53 ft.; height of the vaulting 125 ft.

The axis of the choir is continued in a straight line nearly to the end of the nave, where it breaks off suddenly to the north, and falls into the axis of the Norman west front (PENROSE). The doorway opening from the south great transept into the south choir aisle deserves especial notice for the beautiful sculpture; it belongs to the last period of Early English. The east window is 53 ft. high by 30 ft. wide in the glass, which dates 1855. The wheel window of the north transept retains its original stained glass; it is one of the most splendid, and in its present state one of the most perfect works of the thirteenth century (WINSTON); it dates about 1200, and is filled with plate tracery, and on the exterior is delicately ornamented. The circular window of the south transept dating about 1350, is of extreme richness and noticeable as a pure example of the Decorated period. The stone beam above the nave vaulting between the west towers, is composed of 23 stones, 11 ins. deep and 21½ ins. wide, chamfered on the lower edge, the span is 27 ft. 11 ins., with a rise (in 1840) of only 14½ ins.; it is illustrated by NICHOLSON, in the *Transactions of the Institute of British Architects*, 4to., London, 1842; and noticed in CIVIL ENGINEER, etc., *Journal*, 1841, iv, 97; v, 299; vii, 247; and by WARE, *Observations on Vaults*, in the *ARCHÆOLOGIA*, 4to., 1814, xvii.

There were formerly (thirty-eight, CAMDEN, but generally said) fifty-two parish churches (named in Add. MS. 8938 in the British Museum as existing in 1597, seventeen were standing 1640), of these thirty-four were destroyed prior to the time of king Edward VI; there are now fifteen parishes having thirteen churches; they are mostly small, poor, and much mutilated. Of the churches, S. Mary le Wigford, and S. Peter at Gowts, have each a tall tower with long and short quoin stones, and walls pierced only by a door below, and by coupled bellry openings, nearly resembling those of the villages of Bracebridge and Harleston, a few miles southward. The former church has an Early English nave arcade and east end, both with later insertions; details are given in PUGIN, *Specimens*, i, pl. 5, 52; the font, pl. 28; an elevation of the interior showing the east end, is given in the *ILLUSTRATED LONDON NEWS JOURNAL*, 1848, xiii, 60; the latter church is a Romanesque structure, the nave and north aisle were destroyed during its restoration about 1848; (CUSHION CAPITAL; JEW'S HARP ORNAMENT); it has a south aisle of the fourteenth century: S. Benedict, is Early English with later insertions and additions: S. Peter at Arches, the largest in the city, was rebuilt 1723 at a cost of £3373; 14:4: S. Margaret was rebuilt 1778: SS. John and Nicholas, near Newport gate (Early English) 1839-40 is by Messrs. Scott and Moffatt; and S. Michael on the Mount 1859 is by S. S. Teulon. A Roman Catholic chapel 1799 enlarged 1854, with about ten other chapels, do not deserve particular notice, except the Wesley chapel 1837 by W. A. Nicholson for 2000 people, with a wide span roof.

The other principal establishments are the county courts within the castle walls 1823-26 (Gothic) by Sir R. Smirke, cost £40,000; the county gaol 1786-88 by J. Carr of York; the county assembly rooms; the county hospital 1769; the lunatic asylum for 50 patients 1819-20 by Ingleman of Southwell, 260 ft. in length, cost £15,000, the two back wings by Hartley; the judges' lodgings 1810; the city gaol and house of correction 1805; the sessions-house 1809; the union 1837 by W. A. Nicholson; the butter-market 1736, with the city assembly room over it, 1737; the butchers'-market 1774; the theatre 1806; the corn exchange 1847 by W. A. Nicholson and since enlarged; the post-office 1860 by H. Goddard, 30 ft. by 22 ft., at a cost of £1100; the new mechanic's institute 1861-2 not to exceed £2000, as described in *BUILDER JOURNAL*, 1861, xiv,

531; Christ's hospital or the blue-coat school for 100 boys on the foundation; the free grammar school founded 1567, and other schools; the Sibthorp almshouses; the S. Anne's chapel with the adjoining almshouses designed by A. W. Pugin. The old free school, used as the mechanics' institute 1833, was held in the remains of the monastery of the Grey Friars. The hospitium or Monks' house, a cell of S. Mary's abbey, situated in the fields to the south-east of the town, shows part of the refectory and chapel with Perpendicular insertions in late Norman walls.

BUCK, *Antiq. in England and Wales*, fol., London, 1774; HOWLETT, *Selection of Views*, 4to., Lond., 1805; WILD, *Cath. Ch. of Lincoln*, 4to., London, 1819; republished by BRITTON, 1837; BRITTON, *Arch. Antiq.*, 4to., London, 1826, v, gives eleven plates of details; B. WILLIS, *Survey*, 4to., 1727; *Historical Account of the Cath. Ch.*, 8vo., Lincoln, 1771; STARR, *Hist. of the Bishopric*, 8vo., London, 1852; BUILDING NEWS JOURNAL, 1859, v, 818; KING, *Eastern Cathedrals*, 8vo. (Murray), Lond., 1862. The sixth annual meeting of the Archaeological Institute is described with woodcuts in ILLUSTRATED LONDON NEWS JOURNAL, xiii, 1848, p. 59-72-76; the papers were published 1850. *History and Antiquities of Lincoln*, 12mo., Lincoln (Brookes and Co.), 1865; ESSEX, *Obs. on L. Cath.*, 1775, in *ARCHÆOLOGIA*, 1786, iv, 149; MOULE and WINKLES, *English Caths*, 8vo., Lond., 1836-42; SANDERSON, *Survey of L. Cath.*, 1641; ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., Lincoln, 1850-67; SHARPE, *On L. Cath.*, in *BUILDING NEWS JOURNAL*, 1868, xv, 480, 498, read at the Lincoln Diocesan Architectural Society; and PADLEY, *Selections from Ancient Edifices*, 4to., Lincoln, 1851, which contains details of many of the city edifices.

ALLEN, *History of Lincolnshire*, 4to., London, 1830-34; HOWLET, *Churches and Castles*, 4to., London, 1805; ANDERSON, *Handbook of Lincolnshire*, 18mo. (circa 1848); LEWIN, *Selections from Churches*, 2 pts., 8vo., Boston (1843); TOPOGRAPHICAL SOCIETY OF LINCOLNSHIRE, *Papers*, 4to., Lincoln, 1841-42; LINCOLNSHIRE SOCIETY OF ECCL. ARCH., 2 vols., 8vo., 1814-49; MORTON, *Churches in the Division of Holland*.

LINCOLN (ALEXANDER, bishop of), a native of Normandy, was raised to the see of Lincoln in 1123. He built the castles of Banbury, Sleaford, and Newark, by which he excited the jealousy of king Stephen, who seized the two latter castles and committed the prelate to prison. The latter building is a rare example of any departure from the established system of fortification at that period, and its remains indicate the first step towards that union of habitable space with strength in castles, which afterwards expanded into the magnificence of Warwick, Kenilworth, and Alnwick. He also built the monasteries of Dorchester, Haverholme, Thame, and Sempringham; and subsequently decorated and improved Lincoln cathedral, to which after the fire of 1141 he added a roof of stone: the three doorways in the west front are assigned to this bishop, who died in 1148 and was buried in the cathedral. His name is placed in this Dictionary because, like Gundulph, he is reputed to have devised the works above mentioned, but no better authority for this reputation has been discovered than MILNER, *Treatise Eccl. Arch.*, 8vo., Lond., 1811, p. 42, who designates him as "one of the greatest architects of his age," and, "among others present at the completion of the presbytery of Peterborough cathedral in 1140 was Alexander, bishop of Lincoln, one of the most princely prelates and accomplished architects of his day," POOLE, in *ASSOCIATED SOCIETIES, Reports and Papers*, 8vo., Lincoln, 1855, p. 200.

LINCOLN (JOHN DE), master of the works 1350 at S. Stephen's chapel, Westminster, was directed to buy as much glass as was wanted; Rot. Pat. 24 Edward III, pt. i, m. 26, cited in SMITH, *Antiq. of Westminster*, 4to., Lond., 1807, p. 83.

LINCOLN QUARRY. The strata at Lincoln (commencing north of the cathedral) may be said to be comprised in twenty-six beds, which slightly vary and thin off in some parts but lie

horizontally, from 6 to 18 ins. in thickness (with the exception of the upper oolite) till the ochrey ferruginous stone beds are reached. They are thus styled; 1. Alluvial soil, from 6 to 10 ins. thick; 2. Rubbly stone; 3. The "blue" bed, a hard limestone; 4. Knobbly or boss rubble, under which is a layer of marl; 5. The "shell" bed, with a layer of marl under; 6. "Blue limestone" bed; 7. Three beds of "grey limestone," each bed having a layer of marl under; 8. Three beds of fractured limestone, each having a layer of marl under; 9. The "roof" bed of strong limestone, under which the ancient builders mined for superior stone; 10. Three thin knobbly beds intercepted with marl; 11. "Oolite freestone" bed; 12. "Silver" bed; it abounds with corubrahi and archimedes shells; is allied to Forest marble; and when faced is used for chimney pieces and floors of passages; it decomposes oily matters; and is a durable stone for buildings in dry situations; 13. A bed of good building stone superior to No. 12, about 16 ins. thick, having the same shells, but in some parts is free from corubrahi; 14. Two beds of good stone with oolite disseminated, useful for foundations and building purposes. The quarrymen now do not work below this bed. 15. Oolite, or roe stone, bed, nearly 2 ft. thick; it is hard, and becomes harder by exposure to a humid atmosphere, which may account for its durability; in some parts of the stratum the stone is "blue-hearted"; 16. Indurated clay, 6 ins. thick; 17. Very hard "blue" stone, divided into two beds by a horizontal flaw in the middle; under which is a bed of very hard indurated clay, 4 ins. thick; 18. A thin bed of hard fine sandstone; 19. "Grey oolite" bed; 20. "White oolite" bed; the three last form one massive bed nearly 4 ft. thick, equal in hardness to the oolite bed. A thin layer of clay about 1 in. thick is next below this; and 21. "Lower oolite" bed, not so hard as the beds above; lying on a bed of yellow ochrey earth; 22. "Ochrey ferruginous stone" bed, through which flows the spring water by the Monks' house; 23. "Ferruginous gravel and sand" bed; 24. Thick bed of "clunch clay"; 25. "Ferruginous gravel and sand" bed; and 26. "Blue clay shale," an excellent clay, when ground, for tiles and floor bricks; it is of great thickness, dipping beneath the sand bed of the river.

From the oolite bed (No. 15) was obtained the stone for the Roman Newport gateway, built nearly 1700 years since. Large blocks of it may be seen in the main street a little above the hospital gates, being the remains of the south Roman gate destroyed long since. The cathedral is evidently built of the stone from Nos. 12, 13, 14, with a portion of No. 15, bed. John of Gaunt's house was built of No. 15. The new church in Newport was built of Nos. 12, 13, and 14, beds; BEDFORD, *Description of the Strata*, etc., printed in the local guide book. The quarry is nearly exhausted. Haydon quarry freestone is said to have been also used in part of the cathedral.

This stone, "although it blackens on exposure to the air, is almost indestructible, and completely retains the sharpness of its sculpture: the marks of a toothed chisel with which it is worked are visible on many parts of the interior;" KING, *Eastern Cathedrals* (Lincoln), p. 269. The blackness is probably only due to the atmospheric effects, and not to any quality in the stone itself.

Mr. J. C. Buckler of Oxford affirms that it is a peculiarity of the Lincoln oolite, unknown to architects who have not employed it, to become coated with a hard surface which preserves it; and that all that was done at Lincoln (during the restoration of 1864) was to remove the black sooty matter by which this surface is overlaid; first, by wetting the stone with water from a brush, and then taking off the black with a small tool without either mallet or hammer, leaving the toolmarks of the old Norman workmen; not even this process, it is said, has been, or will be applied to the Norman carvings; BUILDER *Journal*, 1865, xxiii, 33. A severe censure in the ECCLESIOLOGICAL *Journal* for 1865 and 1866, of the result of this work was given condensed in BUILDING NEWS *Journal*, xii, 691,

867: the defence of the system was urged by BUCKLER, *Description*, etc., of the *Restoration*, 8vo., Lond., 1866: the attack was continued in the same *Journal*, xiii, 557, 573, 671.

LINDEN, OR LIME TREE, see *TILIA*.

LINDEN (JAN VAN), is only known by his having made the design of the beautiful marble pulpit executed 1756 by the sculptor A. Trauen at Dordt.

24.

LINDEN (ADRIEN VAN DER), born at Ghent about 1640, became city architect. He rebuilt the house called S. Macaire, or des pestiférés (*pest-huys*); and 1689 directed the marché au poisson, on plans by A. Quellyn, who had designed and erected the entrance gateway; both are given in GOETGHEBUER, *Choix des Monumens*, fol., Ghent, 1827, p. 11, pl. 17-8. *Histoire van Belges*, edited by Vanderhaeghen, ii, app. 2, p. 83; REVUE DE BRUXELLES, 8vo., Brux., 1837, p. 14.

LINDUM, the Roman name of LINCOLN in England.

LINDUS, the modern Lindos. One of the most important and most ancient towns in the island of Rhodes. The ruins of a dodecastyle Doric portico exist in front of a cavern. LEAKE, *Asia Minor*, 8vo., London, 1824, p. 225. It existed B.C. 408 when Rhodes was founded. There are many tombs cut in the rocks; the remains of a theatre; and ruins of two Greek temples on the acropolis. Ross, *Reisen auf den Griechischen Inseln*, 8vo., 1835, etc., iii and iv, describes the mutilated remnants. At this town, it is considered, that the pottery known as Persian was made by Persian workmen taken prisoners by the Rhodians; the manufacture has long ceased to be carried on, and the pottery, which is earthenware with a white glaze brilliantly painted and gilt, is now of great value.

23.

LINE. To line a room as with boarding, is called "to clead" in the north of England; LONDON, *Encycl. of Villa Arch.*, 8vo., Lond., 1833; 1842, p. 990. LINING.

LINE (It. *corda*, *cordella*; Sp. *cordelejo*; Fr. *cordeau*; Ger. *schnur*). A string or cord of considerable strength used for various purposes in artificer's work. It is made of hemp spun and twisted by machinery, and differs from string in its being stronger and more compact in fabric. The number of various sorts of line used for nautical purposes is immense; those for building purposes are chiefly the following.

The *ranging line* used by excavators, and bricklayers, in setting out foundations, etc. This is very similar to the line used by gardeners, and is generally kept on an iron reel or turnpike, with a strong iron pin at the other end to drive into the ground.

The *hne-pin line* is about as thick as whip-cord, and is used to enable the bricklayer to keep his courses level. LINE-PIN.

The *plumb line*, which is used by nearly all trades, is a finer line still, and is attached to an egg-shaped weight, and fitted to plumb-rules, levels, triangles, etc. For very nice joiner's work the lines are of strong silk.

The *chalk-line* is about as thick as the plumb line, and generally kept on a small wooden reel. It is used for obtaining a straight line between any two points. After having been drawn several times over a piece of chalk to fill the interstices of the cord with its powder, the line is then strained between the two points; one of the two workmen holding it, lifts the line in the middle by his finger and thumb directly upright to a convenient height that it may spring hard enough down, and then lets it go again, so that it swiftly applies to its first position, and strikes so strongly against the stuff, that the dust or atoms of the chalk that were rubbed into the line, shake out of it, and remain on the stuff; MOXON, *Mechanick Exercises* (Joinery), 4to., London, 1633, p. 96. This line is used by sawyers and carpenters for "lining of the stuff" or marking long timbers, which have to be cut down lengthways, for the guidance of the saw; or for cutting stuff to thicknesses; or in ripping out thin stuff to widths; listing off sap, etc., or in setting out straight work on a floor. The chalk line is also much used by plumbers in cutting lead out of a sheet; or as a guide in dressing turn-ups, in bossing, etc. Masons prefer to use red ochre instead of chalk, in which case it is called a *ruddle-line*.

Lines for constructional purposes will be found under their respective heads. *SASH-LINE.* A. A.

LINE. An implement used in measuring. A "line to measure v perches—to sere it in hote waxe due rosyn, that it maie kepe at all tymes his true length"; DE BENESE, *Manner of Measuring*, etc., 8vo., London, (1540), b. ii. "To measure land with; a cord 5 perches long well seared with wax and rosin, knotted or marked at each perch"; DIGGES, *Tectonicon*, 4to., Lond., 1556; pub. 1637. "Morgan had a line of wyers. They measured the poles and lines with two foote rulers, and yarges, whereof some differed from other halfe an inch"; WORSOP, *Detective of Sundry Errors*, 4to., Lond., 1582, fol. c, (2). A "wyer line or surveyer's chain of 2, 3, or 4 perches in length"; LUCAR, *Solace*, 4to., Lond., 1590. A 'line' is mentioned as sometimes used in measuring artificer's work, in MANDEY, *Measuring*, 8vo., London, 1727, 4th edit., p. 189. *CHAIN; TAPE.*

LINE. A French measure of length, equal to the twelfth part of an inch of the foot scale.

LINEAL MEASURE. A measure by which the length of places and things are ascertained. *MEASURE.*

LINEAR PERSPECTIVE. The art of representing buildings and other objects by simple lines without shadows. The term is used in opposition to that of *AERIAL PERSPECTIVE*, where distances are indicated by tints of greater or less brightness. *ISOMETRICAL; PERSPECTIVE.* A. A.

LINE FOREMAN. This name, as applied to a workman who draws out templates, or who marks on a floor or board, or on the stuff to be used, the chalk or lead lines which are to guide a mason, carpenter, joiner, or plumber, does not appear to have been usual in shops until the period (say about 1825) when the several trades were combined in one establishment whose master could not do such work.

LINEN PATTERN. A decoration of wood, and sometimes of stone, pannels carved late in the Perpendicular period. It has also been called the *toile* or "napkin" pattern (BRITTON, *Diet.*, p. 345), from its resemblance to the folds of that article. On wood work it has evidently been stuck by hollows and rounds, and the ends cut by the gouge and chisel. It is said to be of Flemish origin, as that people were the great manufacturers of fine linen at the period above named: and it is found largely in carved oak work in Flanders; the popularity of the pattern may owe its origin to the good feeling between England and the Low Countries, when both were then allied together against France. This ingenious device does credit to those artist carvers as showing how possible it is to elevate the simplest object from a mere commercial to a tasteful expression. *Illustrations.* A. A.

LINEN ROOM (Fr. *décharge*). A small apartment placed near the bedrooms, where the bed and table linen of the establishment is kept; personal linen being carried direct to the bed rooms or dressing rooms; and the table linen actually in use being placed in charge of the butler or other upper servant. It should be kept very dry and well ventilated; a fireplace or warming apparatus is a useful accessory. The fittings consist of a dresser under the light, for folding; with presses containing sliding trays, shelves and drawers. A closet fitted with broad shelves or presses is sometimes provided, for bedding and upholstery.

The soiled linen closet or room is best placed adjoining the washhouse, or near it, but not in a position where pilfering is to be feared in case of the door being left unlocked. When the washhouse is removed from the house, a place on the bedroom floor is frequently preferred on this account, which must be well ventilated if not lighted. If the closet required be a large one, it may be fitted up with bins for the classification of the articles. A bin or box should be provided in the washhouse for the used linen. KERR, *Gentleman's House*, 2nd edit., 8vo., London, 1865, p. 238-9.

On the Continent, where the stock of linen in a family is

large enough for the whole usage from one annual wash to another, the linen rooms are too frequently part of the *grenier*, or even of the cockloft, if there be more than one story in the roof; and, in most establishments, one closet or room is almost a counterpart of the other. But this custom of an annual wash is fast disappearing from the leading towns, because it has been found, that the flimsy fabrics of the present day *fret* during so long a confinement in the dirty-linen closet. In Denmark and the warmer districts of Sweden and Norway, the nursery is placed contiguous to the bath-room and linen-room; the connection or conjunction of the two latter in an English small country-house has been found more convenient than the Continental system of making the sitting-room of the virtual house-keeper or confidential upper servant serve as the linen-room of the family. In inns and similar places, the linen room frequently adjoins the butler's pantry, and is in connection or conjunction with the laundry and ironing room, etc.: in other cases it is also used as an ironing room and linen room.

LINE OF DIRECTION. The first general line proposed for laying out a road, a railway, etc. It is originally traced out on some map, plan of estate, or Ordnance sheet, and then the centre line is roughly marked out on the ground by poles or stakes; it is revised and corrected from time to time, and then finally proved, and the execution of the work commences. A. A.

LINE OF STATION, or, as it is more generally called, the station line, or line of direction, as used in land surveying, is the line traversed by the chain from station to station, and forming the base from which the offsets are taken. The set of station lines, whether obtained by the theodolite, or by triangulation with the chain only, should be plotted and proved before the detail of the offsets is laid down. Station lines should never be used in computing. A. A.

LINE PIN. A pair of line pins of iron, having a length of line or cord upon them about 60 ft. in length, with tangles or tringles, (i. e. small pieces of iron twisted so as to hang loose on the line, fixed at intervals into the work to prevent the sag of the line), is used by bricklayers as a guide to lay each course of bricks level on the bed, or straight on the surface, "a line seldom holding to strain or draw straight in length above 50 or 60 ft.," as noted in MOXON, *Mechanick Exercises* (Bricklayer), 4to., London, 1700, p. 10. The line pin is always used in pairs; they have flat button-shaped heads about three-quarters or an inch across, a round shank on which to wind the line, and a flat pointed blade to drive into the mortar joints. A. A.

LINGAM. A short cylinder with a rounded top, generally made of stone, which is considered by Hindoos to be sacred to their destroying god, the Mahadeo Siva. A striking proof of its popularity occurs in the statement, doubtless made with Oriental exaggeration, that ten thousand such symbols existed, about the middle of the seventh century, at Bhubaneser. The form (not unlike that of the round granite posts placed at the corners of streets in English towns) is shown in the representations of the interior of the great (Buddhist now Sivite) cave at Karli, where, according to FERGUSON, *Rock Cut Temples*, 8vo., Lond., 1845, p. 29, the Buddhist *daghopa* performs "the part of a gigantic lingam, which, it must be confessed, it resembles a good deal." These pillars are so certainly priapic, that the meaning of the words 'lingam and yuni' could only be rendered as 'phallus in loco' by WILSON, *Religious Sects of the Hindus*, printed by the ROYAL ASIATIC SOCIETY *Researches*, 4to. London, 1828, xvi. The word *yuni* does not appear to have reference to Siva's consort, Parvati.

LINGOA, or Amboyna Wood. This wood may be obtained from Ceram, in the Molucca Islands, in any quantity. It was largely imported at the time when those islands were British possessions. It is very durable and takes a high polish. By taking advantage of the spurs or lateral growths at the lower part of the tree, very large circular slabs can be obtained, even up to 9 ft. diameter: one nearly 7 ft. in diameter was exhibited

in 1851. The *kayu buka* or *kiabooka* (PTEROSPERMUM), which is brought from Ceram, New Guinea, Arru, and the other islands, is a knotty excrescence which forms on the stems of the lingoa tree, and is much esteemed for cabinet work, although its use has of late years decreased in Europe, but not in China.

71.

LINHAY. A term used in Somersetshire and some adjoining counties, for an open cowshed.

LINING. The term given to the material, chiefly stone, wood, or metal, which is used for covering, either on the outside or inside, any work, such as a box, basin for a fountain, (Fr. *douve*), &c. **COAT; JAMB LINING.** Amateurs sometimes give the term "wall-veil" to a lining of marble: and notice should be taken of the linings applied to walls and ceilings by the Romans, who accepted or introduced **LASTRICATION**, or the employment of marble slabs; and **OPUS MUSIVUM**, not only in marble but in glass ("e vitro," PLINY, *H. N.*, xxxvi.) Mention need only be made of the gypseous ashlar of the Oriental palaces; of the stone linings to brickwork found in some Egyptian constructions; of the indications of metal (probably bronze) in Hellenic tombs or treasures; of the **LAMBRUSCATION** with wood to the temple built by Solomon (1 KINGS, vi, 15); and of the tiles used in Roman work. Authorities upon the employment of lining with deal, and wainscoting with oak, have been collected by W. PAPWORTH, *An Attempt to determine the periods, in England, when Fir, &c., were first introduced*, read at the Royal Institute of British Architects, *Sessional Papers*, 1858, p. 1. The extensive application of mirrors as linings of walls about the end of the seventeenth century, is attributed, in France, to the elder R. de Cotte. The use of coloured tiles upon external as well as upon internal work, is shown in the illustrations to **TEXIER, Arménie**, fol., Paris, 1842, as the enrichment of Persian buildings, and was largely so used by the Moors; it was probably communicated from Spain to the Low Countries; but although Dutch tiles had been long used as a lining for the recesses of fire-places, the white glazed tiles, now used in many shops, and for lining brick walls for reflection of light, are of late introduction. The employment of slate slabs as a lining for the walls of safes, plate-closets, and dairies, and also for hiding the damp in badly constructed basement walls, dates from about 1840-5.

LINING, or LINING-BOARD. The name given by the joiner to the thin boarding used for covering walls and ceilings, instead of plastering them. This is generally done, when it is anticipated that goods will be damaged by the dust from the ceiling, or the plastering of walls by the goods being knocked against it. Lining, grooved and tongued, or matched (in both cases it may be beaded), is occasionally put up to save time that would be required for allowing plastering to dry; but the walls should be dry before fixing the lining, otherwise it will warp; and if the walls be still wet, holes must be made at the top and bottom of the lining boards to allow air to circulate behind them and between the battens, which are secured to the brickwork by woodbricks, plugs, or holdfasts, to receive the boards; the back of the lining when fixed against a brick or stone wall should be tarred. It affords good fixing for shelving and fittings. For ceilings, the lining board is simply secured to the joisting. **FIBROUS SLAB; LAMBRUSCATURE; MATCH-BOARDING.** Lecture rooms lined with thin wood are considered to be greatly improved in their acoustic properties; (SAINT) JOHN.

LINING. Thin stuff nailed on battens and covering the sides of openings in a wall, as a window, where no shutters, or framed work like wainscoting, are required. The term is generally applied to the sides or 'elbows' only, the head being called a soffit; but the sides of a doorway are called **JAMB LININGS**. Its application in the cases of a shutter, &c., are described *s. v.* **BACK LINING** and **BOX**. Linings are mostly distinguished as 'square' or 'splayed'; they generally finish against a **GROUND** on the outside, but sometimes a simple molding

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suffices to hide the junction of the lining with the plastering. In better class work, the inside lining of the sash frame (D in the figure *s. v.* **BOX**) is grooved to receive the inner edge of the lining. The varieties will be best understood from the **PRICE BOOKS**.

A. A.

LINING OUT. The term used for the act of drawing out lines on a piece of board or plank, so as to cut it into smaller pieces of prescribed forms. **LINE; LINE FOREMAN.** 1. 2.

LINING-OUT STUFF. Any thin stuff used in filling out any extra widths of jambs, &c.

A. A.

LINING PAPER. A sort of thin whitish-brown machine-made paper used for covering plastered walls intended to receive the superior classes of paper-hanging. It is principally employed in new work, that the continued action of the heat of the lime may not stain or discharge the delicate colours of the paper; and it has even been found desirable to interpose a coat of litharge between the lining paper and the plaster. Lining paper is usually made of the same dimensions as the other sorts of paper-hanging, viz., 12 yards long and 22 ins. wide; as there is no pattern printed thereon it does not cut to waste as do the other papers. In all cases lining paper, particularly the joints, should be well pumiced down and sized before the ornamental paper is hung. A thin white paper as well as some tinted papers are also called lining papers, which can be procured 30 ins. and 40 ins. wide.

A. A.

LINK. A measure of length being 7.92 ins. from centre to centre of the eyes, or the hundredth part of the Gunter's chain.

CHAIN; LAND SURVEYING.

A. A.

LINO, of Siena, was a pupil of Giovanni Pisano. He practised at Pisa, and designed the chapel of S. Ranieri, in the cathedral; and another in the baptistry of the church of S. Giovanni.

30. 32. 33. 59.

LINOLEUM (from *linum*, flax, and *oleum*, oil). A material produced about 1863 for making floor-cloths. The manufacturers state that it is produced from oxidised linseed oil of the finest quality, which is first reduced to the consistency of dough; then well mixed with ground or powdered cork by machinery; and by the joint action of heat and great pressure, it is rolled on to stout canvass, which is afterwards water-proofed, and the surface may be then printed upon. This material is an economical and comfortable floor-cloth, whether in respect to warmth, elasticity, freedom from smell, resistance to damp, or durability. The colours are so readily absorbed into the solid body of the linoleum, that the pattern is more lasting than that of any other floor-cloth, and can therefore be washed and scrubbed with soap and water as clean as when first manufactured, without injury to it. It is agreeable to walk upon, is not liable to decomposition, and will not turn black. It has a fine granular surface, and is capable of receiving coloured patterns. The floor-cloth is made 1 and 2 yards wide, and about 24 yards in length; passage cloths, 22½, 27, 36, and 45 ins. wide, and about 24 yards in length; with borders of the same length; mats, &c. The cement, sold at eighteen pence per pound, is recommended as a varnish or paint for wood and iron, for uniting those substances as glue. It can be vulcanised or hardened by exposure to heat, becoming as hard as the hardest woods, and capable of receiving a high polish, and in that condition can be planed, filed, or turned, as easily as wood. **MECHANIC'S MAGAZINE**, fol., London, 1865, new series, xiii, 216. The manufacture is based on the inventions patented by Frederick Walton.

The above description is chiefly the manufacturer's statement: the principal defect found, is that it does not appear to stand well before a fire, perhaps this is partly due to the action of the feet of persons warming themselves.

LINSEED OIL. An oil obtained by cold expression of the seeds of the *Linum usitatissimum*, or flax plant, which are extensively imported from Russia, Italy, Egypt, and of late years from India; this latter supply is found to yield a larger proportion of oil than the others. It is pellucid, with a faint

D D

but peculiar odour and taste, generally subrancid. It easily dries (in its normal condition, raw oil does not dry *per se* under fifty hours), and is extensively used in painter's work. By reduction of temperature it scarcely freezes but merely becomes cloudy. It may easily be purified by repeated agitation with water; by bleaching in the sun; or, better, by filtration through newly prepared charcoal. By long boiling it becomes dark brown, tenacious, and thickened, drying more easily; and in this state is used for printer's ink and for house painter's work; by still longer boiling it becomes black, almost solid, and elastically tenacious, like caoutchouc; and in this state is used for birdlime and other purposes. (LINOLEUM). By the addition of nitrous acid it becomes thick, red, and then dark reddish brown, but does not become solid; it is frequently adulterated with rape oil, which may be detected by this test. A simpler test is, that if wood be smeared with oil which has been adulterated, it does not become dry. The manufacture of linseed oil is given in the PENNY CYCLOPÆDIA, supplement, 1846, ii, 373.

When linseed oil is clarified and cleansed by means of sulphuric acid, much of the cohesion in the vegetable property of the oil is destroyed, preventing its forming that perfect pellicle which it invariably does upon exposure to the atmosphere during drying; *BUILDER Journal*, xiv, and xiii, 109, 193, 243, 373. A correspondent to that *Journal*, 1859, xvii, 718, complained that as linseed oil was being largely adulterated, it remained soft and gummy for months. The seed was being imported from the new sources of Bombay and that locality; other oleaginous seeds became unavoidably mixed with it; these are readily identified, and the exact quality of the resultant oil perfectly understood. The result of the exposure of such a mixture to the air is, that the linseed oil dries, but the other does not: they ferment, and the paint compounded of them "sweats." When this impure oil is boiled, the evils of its employment in paint work are largely increased, as detailed in the same *Journal*, p. 747. Common resin is also added to be dissolved in the oil; it is mixed with resin oil; or with some cheap fish or non-drying oils, these last producing effects similar to those due to the other non-drying oils. When common resin is added, the slightest warmth softens it, and it becomes 'tacky,' and it prevents the proper hardening of the paint. Besides this more recent error, there are others that have always existed; among the worst may be named, the empirical handling of materials to form and act as "driers," and the using of materials altogether improper, howsoever handled, for that purpose. The above is very much condensed from papers on the treatment of linseed oil, its trade adulterations, and other cognate topics, by C. Binks, laid before the Society of Arts; *Journal*, v, Nos. 211, 212, 214, (*BUILDER Journal*, 1856, xiv, 702). The method of testing the purity of the oil, either by its own specific gravity, by the oleometer, or by other means, is detailed in the above *Journal*, p. 747, wherein complaints were again made, 1860, xviii, 775, 805: there, for inside plain painting, a little good elastic varnish and turpentine, instead of oil, is suggested, but considered too expensive for general work; and, p. 843, strong representations are made. In xix, p. 15, it is stated that "the adulteration consists of damaged cocoa-nuts, broken up and boiled for a considerable time, then allowed to cool, when a thick coating of light, frothy (yet colourless) fatty matter forms on the surface of the water; and this, being skimmed off, is applied, in its solid state, for various purposes; but if again melted it remains liquid." On some *Malverse Re-actions occurring in Old Paint Compositions*, on p. 3, 34, 121. "Non-drying linseed" oil is again adverted to, 1863, xxi, p. 761; p. 778, work stained with linseed oil and varnished, the latter does not dry; and p. 814 and 919, the turpentine is considered as bad as the oil. In xxii, p. 18 and 49, are some further remarks against the trade adulterations; and an extract from the CITY PRESS *Journal* of Nov. 28, stating, that about 1512 the adulteration of oils, etc.,

was carried to such an extent that an act of parliament was obtained, which empowered the mayor, with the master and wardens of the company of Tallow-chandlers, to examine all oils and tallow; but, temp. Elizabeth, on petitioning for further privileges, the mayor and aldermen in 1583 resisted the patent; SRRYPE's edit. of SROW, *Survey*, fol., London, 1720, ii, 210.

A correspondent asserts that the only oil that can be depended upon is cold-drawn linseed oil made from selected and sifted Russian seed.

Linseed oil as a *varnish* is mentioned in the eighth century by ERACLIUS, *De Coloribus et Artibus Romanorum*, published by RASPE, *Critical Essay on Oil Painting*, 4to., Lond., 1781: also as in common use in the early half of the eleventh century (or later) by the monk THEOPHILUS, *Diversarum Artium Schedula*, partly given in RASPE; and by HENDRIE, *Arts of the Middle Ages*, etc., 8vo., London, 1847. The treatise of CENNINO CENNINI, explaining the practice with it in the fourteenth century in Italy, first published by TAMBRONI, as *Trattato della pittura*, etc., 8vo., Rome, 1821; is translated by MRS. MERRIFIELD, 8vo., London, 1844. But the van Eycks are usually said to have *invented* oil painting, that is, painting with colours mixed up with linseed oil; it is now held that they only used a prepared oil or varnish invented by them, with the colours. VASARI states that "van Eyck found that by mixing his colours with these prepared oils (that is, the *varnish*) instead of with the common *tempera* vehicle, his pictures required no varnishing at all, or that they were then quite as brilliant without varnish as they had previously been with varnish; s.v. Antonelli da Messina, who learnt the secret from Jan van Eyck just before the death of the latter (June 1440). The often quoted precept of 23 Henry III, 1239, has the words "pro oleo vernici et coloribus emptis", which scarcely prove the use of linseed oil; WALPOLE, *Anecdotes*, 8vo., Lond., edit. 1862, p. 67. The following extract has, it is thought, hitherto escaped attention; ALBERTI, *De re Edificatoria*, fol., Florence, 1485, b. vi, ch. ix; says "Novum inventum oleo linaceo colores quos velis inducere contra omnes aeris et coli injurias eternos"; which has been translated in the edition 1726, ii, 15, as follows. "It has been newly found out that colours mixed up with linseed oil, will stand a vast while against all the injuries of the air and seasons,—provided that the wall be perfectly dry and quite clear of moisture."

LINTEL, formerly spelt lentel, lentil, lintel, and lintol; and written lyntol, lynterelle, and lintelle. (Lat. *supercilium*, not *antepagmentum*; Fr. *linteau*; It. *soprasoglia*; Sp. *lintel*; Ger. *sturz*.) A horizontal piece of timber or stone placed over an opening to carry the superincumbent weight. If a wall be very thick, more than one lintel piece will be necessary, unless one of a sufficient width can be obtained. In some old books on carpentry, lintels are classed under wall-plates; but the word is now never used in that sense, unless the joisting or tie-beams rest upon it, in which case it is both a lintel and a wall-plate: it is also called a lintel beam. This was recommended to be covered with LOAM to preserve it, and to prevent the mortar touching it; MOXON, *Mechanick Exercises*, (Bricklayer) 4to., Lond., 1700, p. 26. LANGLEY, *Builder's Complete Assistant*, 8vo., Lond., 1738, p. 149, states, that "lentils laid in piers between windows for the support of girders, should be firmly bedded on a sufficient number of short pieces of oak, laid across the walls, vulgarly called templets, which are of excellent use." He describes the large size that lentils should be; and that it "is commendable to turn small arches over their ends, that in case their ends are first decayed, they may be renewed at pleasure, without disturbing any part of the brickwork; and their ends be anointed with melted pitch and grease, viz., of pitch 4, of grease 1; and indeed, if the lentils were covered, it would contribute very greatly to their duration." The ends of lintels are now usually in good works tarred when placed in contact with brickwork or masonry. HASWELL, *Strength of Girders, Beams, and Lintels*, for *Journal* of the Franklin

Institute, reprinted in *BUILDER Journal*, 1861, xix, 260-1. BRESSUMER.

1. Lintels are bars of wood inserted in lieu of arches over the apertures of doors and windows, but they should always be surmounted by discharging arches abutting upon the solid brickwork beyond the ends of the lintels, which, in such a case may be made to tail into the wall to a very short distance only beyond the sides of the aperture. Where, however, there is to be no discharging arch over the lintel, it should be of sufficient length to tail considerably into the wall, and its ends should rest upon transverse templates, or wood-bricks, built into the wall. In the former case, the real utility of a lintel is to afford good fixing to the soffits of the linings of the opening. DISCHARGING ARCH.

14. The term is also given to the transverse top or head of a solid door frame.

The Metropolitan Building Act, 1855, § xx, requires "an arch of brick or stone, or a bar of wrought iron, over the opening of every chimney, to support the breast thereof. CHIMNEY BAR. "Gibb's fire-place lintel," consisting of a cast iron plate with an opening in the middle, narrowing the width of the flue when set in the brickwork, is noticed in the *BUILDER Journal*, 1867, xxv, 282. It appears to be similar to Edwards' patent chimney bar, noticed in the same *Journal*, xviii, 535. HOPPER.

A lintel of concrete is noticed, s. v. Béton. The mantel over a fire-place, which is sometimes formed in pieces of stone joggled together, has been called by this name, as well as the flat stone over a door or window opening. FLAT ARCH; JOGGLE JOINT. SMIRKE, *Mode adopted by Masons at various and distant periods in forming a straight head over an aperture*, in the *ARCHÆOLOGIA*, 4to., London, 1838, xxvii, 381; GWILT, *Encyclopædia*, 1867, § 1925 e-g, gives examples.

LINTLAER (JAN), a Flemish artist, is mentioned in a letter of Henry IV. of France to Sully; he constructed the pompe de la Samaritaine at Paris. *REVUE DE BRUXELLES*, 8vo., Brux., 1837, p. 15.

97. LINTZ OR LINZ (the Roman Lentia, It. Lincien). The chief city of Upper Austria. It is situated on the river Danube, on the line of the railway from Budweis to Gmunden; the river is crossed by a timber bridge built towards the end of the fifteenth century, 864 ft. (or upwards of 1000 ft.; or 1700 ft., MURRAY) in length. The city consists of the old town and of a suburb with another suburb across the river; and is defended by thirty-two detached circular forts connected by a covered way, nine miles in circuit; they are fully described in MURRAY. The streets are well paved and lighted, and the houses well built, many of them being very lofty and having the ground story vaulted with stone, probably to protect the upper floors from being inundated; a stone in the hotel, 2 ft. 9 ins. from the ground, shows the height of a flood, the level of the river being generally 15 or 16 ft. below the roadway. A fire 12 August 1800 consumed the county hall, castle, and many other buildings with seventy houses. The larger of the two market places is 750 ft. in length; this contains in the centre a Trinity pillar (*driefaltigkeitssäule*) 84 ft. high, erected 1717 or 1723, between two statues of Jupiter and Neptune above two fountains; and a statue of the Virgin.

The cathedral, dedicated to the Assumption of the Virgin, formerly belonged to the Jesuits; it was built 1670 in the French style of the period, but a great portion was altered 1822: it was 168 ft. long and 72 ft. high, having a dome covered with copper, and two towers. A new building in the German Middle Pointed style by V. Statz of Cologne, was commenced 1862; it is shown in HOFER, *English Cathedrals*, 8vo., London, 1861, p. 70, with a plan, 408 ft. extreme length and 206 ft. in width at the transepts, making it the largest modern church in Europe, and the largest cathedral in Austria. At present (1867) the crypt, the lady chapel, and foundations only are completed; a plan is also given in *BUILDER Journal*, 1867, xxv, 794, 802. The other churches are, the very old town

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church, greatly altered 1822, now having a nave and two aisles divided by six pillars; 156 ft. long altogether and 90 ft. wide; with a tower 300 ft. high, by J. Veith, finished 1823, containing five bells cast 1693, the heaviest weighing 85 zentners: the church of the Cistercians: the Carmelite monastery, and the church, of S. Joseph, both finished 1710 by a lay brother; this church has the highest tower in the city and was restored 1819: the Capuchin church of S. Mathias restored 1786, which contains the monument of general Raimondo Montecuculi (died 1681): the church of the nunnery of S. Ursula, built 1732 by M. Krinner; its two towers were finished 1772: the *Alumnatskirche*: the church of the nunnery of S. Elizabeth, built 1764-8 by M. Drientl of Vienna in imitation of that of S. Charles in the metropolis: the *Maria Thal* chapel built 1690, restored 1746: and the Minorite church, now called the *landhauskirche*, because its Franciscan monastery, altered after a fire in 1800 and having a very high tower, is now the *landhaus* or place of meeting for the estates of Upper Austria.

Among the other buildings of importance are, the *rathhaus* built 1414 enlarged 1659, also having a tower: the town barrack, formerly the Jesuit college, dating 1652: the episcopal palace; the *schloss* or *hofburg* built 1800, on the site formerly the palace of the dukes of Austria, was a prison, and penitentiary called the *schloss und strafhaus*, but has recently been used as a barrack; the mansion called the *khevenküller'sche haus*, the town brewery, built 1590, enlarged 1643, 1678 and 1688; the buildings of the royal factories of wool, cloth, and carpets: the theatre built 1803; a museum; two lunatic asylums; an infirmary; a seminary; and a lyceum. A view is given in LANGE, *Ansichten von Deutschland*, 4to., Darmstadt, 1851, ix; and in BEATTIE, *Danube*, 4to., London, 1844, p. 87. HEINSE, *Linz und seine Umgebung*, 8vo., Linz, 1812; PILLWEIN, *Beschreibung*, 8vo., Linz, 1824.

14. 26. 28. 96. LINTZ SAY (JEAN), born 1759, died 1822, was an eminent practitioner in Poland; CHODZKO, in *Hist. de la Guerre*, etc., 4to., 1855, etc., p. 94.

LION. Amongst the animal forms which have been extensively spread by the artist, that of the lion has been most frequently employed where superiority may be supposed to have been the quality to be symbolized, if anything esoteric at all were meant. A dignified representation in bronze of the beast is all that up to the present time has been understood as the intention of Landseer and Marochetti in the lions placed in Trafalgar-square, but critics may hereafter discover that "the Anglo-Saxon characteristics must have been meant to be symbolized by the artists, who there wished to represent the British Lion." Varieties of the use of the *body* of the lion or of the lioness with parts of other creatures, or even with foliage, are treated under the articles CHIMERA, GRIFFIN, and SPHINX. The two marble lions of Kiangsou, about 9 ft. high, removed 1865 from the ruins of the pagoda of Kaominse to the Louvre, only need record of their existence in Europe as examples of a Chinese treatment, several centuries old, of this subject. The assertion that no artists succeeded so well as the Egyptians in giving a conventional form to the lion, may be admitted on an inspection of the few examples which are preserved in the British Museum, e. g., an alto-relievo about 30 ins. in length of a walking lion painted yellow with a red mane; a couched lion about 22 ins. in length which has been painted red; the recumbent lion about 18 ins. in length, which may be considered exceptional in several respects; and the splendid pair of red granite recumbent lions, 6 ft. long, from Mount Barkal (Napata) of the time of Amenophis III (Memnon).

The great lion in the British Museum, discovered by Mr. Layard at Kouyunjik, is illustrated in BONOMI, *Nineveh and its Palaces*, 8vo., Lond., 1852, p. 69; it is, however, hardly more important as regards style than smaller examples, such as the lions in the scenes of the chase and the return, or as the mummies in lion's skins, or as the three small winged lions which were discovered in the great hall of the north-west palace

at Nimroud, or as the chase and the seventeen bronze couchant lions (called weights) from that mound. An explanation of the use of these bronzes as eyes through which the cords of curtains or awnings were drawn, is given in BONOMI, p. 326, with a copy of an illustration of another such bronze at Khorsabad, from BORTA, *Monument de Ninève*, fol., Paris, 1848-50; pl. 151; and in this example may be seen a remarkable relationship to some other Asiatic-Greek examples. Notice should be taken of the animal in the grasp of the figure found at Khorsabad and called Nimrod, as drawn in two places in BONOMI, pp. 55 and 135; who also, p. 246, gives a figure of the claw marked on the tuft at the end of the tail of some of these lions, with an illustration (natural size) of such a claw.

Much interest attaches to the sculpture of the lion, which has been found in Asia Minor: two of white marble from the Ionic monument at Xanthus, each 5 ft. long: a lion, 10 ft. in length, which surmounted a Doric tomb at Chidus, shown in NEWTON and PULLAN, *History of Discoveries*, 8vo., London, 1863, ii, part 2, pl. 61; are now in the British Museum; and a lion about 20 ft. in length lies at about a quarter of an hour's distance east of the site of Iulis in the island of Ceos. But amongst the most interesting examples of this form are two Greek remains. The pair of (now headless) animals separated by a column, which gave the name to the Gate of the Lions in the walls of the acropolis at Mycenæ, are shown in DOWELL, *Cyclopean Remains*, fol., Lond., 1834, p. 5, pl. 6; and BLOUET, *Expéd. de Morée*, fol., Paris, 1834-36, ii, 151, pl. 65, and they rank amongst the earliest vestiges of art in the country, for Mycenæ claimed to be as old as 1379 B.C. The sepulchre of the Thebans who fell 7 August 338 B.C. in the battle of Chæroneia, was surmounted by a lion as an emblem of their spirit, according to PALLAS, ix, 40: this sculpture was discovered 3 June 1818 by J. Sanders, W. Purser, E. Cresy, and G. L. Taylor; *Builder Journal*, 1862, xx, 908: its reputation probably suggested that which was erected by the government of the Netherlands on the plain of Waterloo, the contract for this monument was taken 1824 at £11,000 to £12,000, the lion being of cast metal to weigh upwards of 100,000 pounds. The dead lion 28 ft. long, introduced by Thorwaldsen in the monument at Lucerne, raised to the Swiss guards who were killed 10 Aug. 1792 at the Tuileries, seems to belong to the same class of ideas. The sitting lion on each post of the dwarf railing in front of the British Museum, resembles the antique example, which caused the Piræus at Athens to be called 'porto Leone', and is now preserved near the gate of the arsenal at Venice. The lion and lioness (heraldically *passant combatant*) over the entrance to the 'tombeau de la Chrétienne', attributed to the first century, which has recently (1868) been discovered in Algeria.

Specimens of the treatment of this subject by ancient sculptors may be seen in the galleries at Florence, Rome, and Naples; also the highly praised two lions executed by A. Canova for the tomb of Clement XIII in S. Peter's at Rome; and a lion in bronze, considered to be Byzantine workmanship, stands in the square of the cathedral at Brunswick.

The description given I KINGS, x, 19, of the throne of Solomon, where "two lions stood beside the stays and twelve lions stood there on the one side and on the other upon the six steps", adds, like II CHRONICLES, ix, 19, "there was not the like made in any kingdom." This may have suggested the throne of the Byzantine emperors with its moving lions; but the example at Jerusalem and at Constantinople does not seem to have been imitated by the Latin prelates (although they undoubtedly held courts in their baptistries or elsewhere near their cathedrals) in the introduction of the lion to the portals of their buildings. Upon the question of a symbolical meaning in the lions supporting columns at portals of churches, reference may be made to SELVATICO, *Su i simboli e sulle allegorie delle chiese cristiane del medio evo*, in the ISTITUTO VENETO, Atti ii, and in Nos. 10 and 11 of GIORNALE EUGANEO, 1846.

The description of the metal work made by Hiram for Solomon, "lions, oxen, and cherubims", on the borders of the ten bases for the lavers of the temple (I KINGS, vii, 29), is evidently the authority cited by S. CARLO BORROMEO, Syn. Prov., iv, in his *Instructions to Church builders*, saying "ubi ostium sculptura leonum ornari debet exemplo templi Salomonis qui in basibus illos sculpi jussit ut præsumit indicaret vigilantiam": this is a piece of symbolism not justified by one word in the original text; and is not more authoritative than the explanations of the possible meaning of lions, in the sculptures at S. Gilles and elsewhere, offered by WARING, *Romanesque Art in the South of France*, in the Royal Institute of British Architects *Sessional Papers*, 1860-61, p. 206. That meaning had been so long lost that it is not even found in a passage of VASARI, *Lives*, edit. 8vo., London, 1850, i, 50, who, speaking of the work about 1289 which he erroneously (copied by FELIBIEN, WALPOLE, and others) ascribed to Marchione instead of Margaritone in the erection of the cathedral at Arezzo, says "animals of many kinds are made to support the weight of some among these columns which they bear upon their backs." The support of shafts in this manner, which was frequently adopted for porches and pulpits in Italy, dates earlier than the end of the thirteenth century: tortoises or sphinxes peeping from the bases of columns are mentioned by CORDERO, *Dell' Italiana Architettura*, 8vo., Brescia, 1829, p. 149, as marks of works executed in the eleventh and twelfth centuries, as at the church of S. Michele Maggiore in Pavia, and at that of S. Michele della Chiusa on Monte Pirchiriano, and at the cathedral in Piacenza: the illustrations of the last named building given in OSTEN, *Bauwerke*, fol., Darmstadt, 1848, pl. 22, show that the shafts without bases of the central doorway rest upon the backs of two recumbent lions, while those of the side doorways have bases and are each supported by a figure of a man sitting astride on a standing lion. These examples, executed at latest 1175-1225, are supposed by CORDERO to be earlier than those found in French and German buildings; and with them may be cited the marble lions and figures said to have been executed 1220 by the sculptor Ventura to the south portal of the cathedral at Bologna. Amongst the latter may be named the lions under shafts to each of the two outermost shafts in the local red marble, of the side portal of the cathedral at Embrun, shown in NODDER and TAYLOR, *Voy. Pitt.* (Dauphiné), fol., Paris, 1843-45; and the granite animals 1286 placed at the chief portal of the church of S. Michel des lions at Limoges; and the lion, facing the open air, which carries the central pier of the double-arched entrance 1020-40 to the cathedral (destroyed 1820) at Goslar, shown in MOLLER, *Denkmäler*, fol., Frankfurt (1852), iii, pl. 1-3. LEONTARIUM.

But the mediæval use of the animal was extended to other positions: amongst which may be cited the lions supporting three of the columns to the pulpit 1260 in the baptistery at Pisa; the lions supporting two of the columns to the pulpit 1302-11 in the cathedral also at Pisa (casts of both pulpits are in the South Kensington Museum); also the lion supporting the lectern in the baptistery, also at Pisa, (illustrated in the *Architect Journal*, fol., Lond., 1849, i, 321): the two marble lions which formed part of the Romanesque pulpit in the cathedral of S. Stefano and Sta. Agata at Capua (Casilinum), but since it was rebuilt 1703-28 have been used as supports to the font; also three supporting the columns to the pulpit in Siena cathedral, *Illustrations*, s. v., pl. 93; and the lions supporting a benitier, a Byzantine work of the Lower Empire, brought from the east in the fifteenth century by René of Anjou, in the cathedral at Angers. Notice should also be taken of the lion of red marble to the balustrade of the steps to the pulpit at Kuchel near Salzburg; those supporting the basin in the 'court of the lions' in the Alhambra, which date 1325-33; and of another cir. 1480 in the church of S. Peter at Wolverhampton, co. Stafford; DOLLMAN, *Examples of Ancient Pulpits*, 4to., London, 1849, pl. 19. The lion, which was placed wher-

ever the Venetian republic dominated, is the winged lion of S. Mark: the metropolitan type lost during its sojourn at Paris 1797-1814, its jewelled eyes and the gospel which supported the right paw. MARZOCO. The celebrated "lion's mouths" for denunciations at Venice, were destroyed before 1846.

The employment of the head and of the paw of the lion in furniture dates from the earliest times, and is too common to need further notice; but mention must be made of the combination of the head and leg, forming a support which graces the Townley collection in the British Museum; as well as of the two large heads of lions therein; and of the famous 'lion's mouth' or *bocca della verità* at Rome; as well as of the fact that a lion's paw holding a wreath or crown occurs over the head of each of the apostles on a tomb in the museum at Arles. The bench ends of the theatre at Iassus deserve attention. The horned lion's head appears on a tomb at Persepolis; *TEXIER, Arménie*, fol., Paris, 1842, ii, pl. 123-5, p. 225.

The use of the lion's head as a GARGOYLE may be referred to the Egyptians: *WILKINSON, Handbook for Egypt*, 12mo., London, edit. 1847, p. 360, mentions, that at the great temple at Médénét Hâboo "the head and forepart of several lions project, at intervals, from below the cornice of the exterior of the building, whose perforated mouths, communicating by a tube with the summit of the roof, served as conduits for the rain-water which occasionally fell at Thebes. The same author, *Arch. of Ancient Egypt*, 8vo., Lond., 1850, xvii, alluding to pl. 1, fig. 27a, says that in some temples lion-headed spouts were also placed on the level of the upper floor, over the adyta and other low chambers of the naos." In the *Handbook*, p. 317, *WILKINSON* mentions the White Monastery on the edge of the desert in Upper Egypt, where "from the walls project blocks not unlike the gargoyles or water-spouts of Egyptian temples as at Denderah and other places: its architectural details are Greek; *ПОСОВКЪ* supposes it to be of the time of the empress Helena." Although generally considered a mediæval peculiarity, it is clear that Greek temples had gargoyles on the cyma of the horizontal cornice. The lions' heads so commonly occurring there are strictly gargoyles and were used for the discharge of the surface-water from the roof. There are examples among the marbles recently brought to England and now at the British Museum, where the action of the rain-water is still visible in the lion's mouths; these are the three lion's heads from the cymatium of the mausoleum at Halicarnassus; *NEWTON and PULLAN*, pl. 30. The application of colour to the terra cotta example at Metapontum, is given in *DE LUYNES and DEBARQ, Metaponte*, fol., Paris, 1833, pl. 7. Similar heads, even if not perforated, were preserved in Roman work of the latest period: and as above shown, it is evident that *WALPOLE, Anecdotes*, 4to., edit. 1762, i, 111, wrote inconsiderately that *FELIENI*, p. 224, states that it was "Marchionne of Arezzo who invented the grotesque monsters and burlesque faces with which the spouts of ancient buildings are decorated; he used those grinning animals (in the façade of the church at Arezzo) only to support columns,—but in so fantastic an age they were sure of being copied and soon arrived at the top." The lion's heads in Egypt, and afterwards in Greece, were, it has been said, used as spouts because the sun was in Leo during the inundations of the Nile. EAR; HEAD.

LION (. . . LE) of Paris, designed the hôtel Villars. He died at the beginning of the eighteenth century. *Almanach des Beaux-Arts*. 69.

LION (. . .) commenced 1833 the entrepôts des sels et d'octroi, rue Alibert, at Paris, which were completed 1841 by E. J. L. Grillon, assisted by Greterin; *GOURLER* and others. *Choix d'édifices*, fol., Paris, 1837-44, ii, pl. 276-7, 271.

LION'S EAR, see EAR.

LIOS, see LISS.

LIOZ STONE. A stone obtained near Lisbon, in Portugal, which in fineness of texture and purity of colour far exceeds Portland stone, and very nearly approaches to marble. The

new national theatre erected in that city 1843-45 was built of this material.

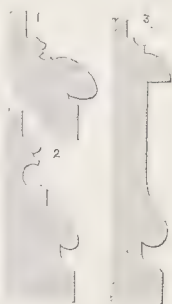
LIP. The term given to the edge of a cup, vase, or basin, presenting a turned-over profile, whether plain or inlaid. BEAK; BIRD'S BEAK; CHINBEAK; EDGE MOLDING.

In plumber's work the term is given to the projecting edge of a cistern, gutter, etc. intended for an overflow; it should be carefully dressed to a proper curve, and should have sufficient projection to throw the water clear of the lining, wall, etc., over which it may pass.

LIP MOLDING. A molding so called from its supposed resemblance to an overhanging or pouting lip. It is common in buttress caps, and base moldings, carved during the Perpendicular period. Fig. 1 is from a base at Dijon; fig. 2 from Monreale; and fig. 3 a fragment from a base of the Perpendicular period.

LIPPI (NANNI, perhaps a corruption of ANNIBALE), son of the Florentine builder Bartolommeo (corrupted to Baccio) Lippi, is usually called Nanni di Baccio Bigio. He was at first a painter and sculptor, but afterwards a pupil of Antonio (Picconi) da Sangallo (ob. 1546), under whom he was employed at S. Peter's in Rome. The repairs to the foundations of the ponte de' Senatori or ponte Sisto (Xystus), also called the ponte Sta. Maria, and the ponte Rotto (shown in *SERRIO*, fol., Venice, 1633, p. 153), in that city, were taken out of the hands of M. A. Buonarroti by whom they had been commenced under Paul III, and entrusted by Julius III to Lippi, with full power to conduct them as he pleased. The bridge was made apparently secure but fell during the flood of (1557, *VASARI*, s. v. Buonarroti, but) 1551 in the chronicles: it was rebuilt 1552, damaged 1564, restored 1575, but half of it was destroyed by an inundation 1598, and it remains in ruins. He was subsequently employed to clear the harbour at Ancona, and about 1563 was appointed surveyor of the works at S. Peter's, contrary to the wishes of Buonarroti who caused inquiry to be made into the reports on the state of that cathedral spread by Lippi: he was dismissed with the reproaches that he had ruined the bridge, and although promising to clear the harbour at small cost, had done it more injury in one day than the sea had in ten years: he was afterwards reinstated at S. Peter's; *GAYE, Carteggio*, iii. Many buildings, inside and outside Rome, were erected by Lippi, according to *VASARI*, who enumerates among them the palazzo of cardinal Montepulciano (the palazzo Ricci of MILIZIA) in the strada Giulia; one of the gates at Monte Sansovino erected by order of Julius III "with a reservoir of water not yet finished;" a loggia and entire apartment added to the palazzo previously built by the elder cardinal di Monte; and before 1560 one of the four palazzi in the island of buildings that belonged to the Mattei family, as described by *LETAROUILLY, Rome Moderne*, 4to., Paris, 1825-60, p. 646, who, in p. 566 and pl. 277 follows the opinion of *BOTTARI* in attributing to Lippi rather than to B. d'Agnolo the commencement of the palazzo Salviati in the via della Lungara for the reception of king Henry III (1571-89) of France, although in *FERRERIO, Palazzi*, fol., Rome (? 1655), pl. 15, the elevation by Lippi is ascribed to the date 1557, during the reign of king Henry II (1547-59). The date of his death is not known. 73.

LIPPI (ANNIBALE) son of the above NANNI, a painter and pupil of F. Salviati (ob. 1563) designed about 1580 the palazzo Medici, now the accademia di Francia, on Monte Pincio, of which a plan and elevation are given in *FERRERIO, Palazzi*, fol., Rome, (? 1655), pl. 13-4; and a view and plan showing the gardens, etc., in *FALDA, Giardini*, or *ROSSI, Gli Esperidi Romani*, fol., Rome, n. d., pl. 7-8; the fontana di Mercurio in



A. A.

the portico of the palace, is given in *FALDA, Fontane*, fol., Rome, n. d., iii, pl. 59. His master left him many of his paintings, etc., and sixty crowns per annum. 73.

LIQUIDAMBAR, the sweet gum. A tree occurring in Java, the Levant, and North America; of the three known species one only will be here noticed.

L. Styraciflua, sweet gum, found in Mexico and in the United States, is a large and fine tree. The wood is of a hard texture, reddish colour, and fine grain, taking a high polish; in Philadelphia it is used for the joists of upper stories of houses; it lasts longer than any species of red oak. It furnishes boards of 2 and 3 ft. in width, used by cabinet makers to line the interior of various pieces of furniture. From incisions in the stem exudes a fragrant liquid resin, called by the same name, and by the native French, copalm balsam. 14. 90.

LIQUIDATED AND STIPULATED DAMAGES. A term used to signify a sum fixed between two parties contracting with each other that certain things should be provided, or works executed in a certain time, to be paid in case of default in carrying out such condition of contract. The object of introducing the clause is to avoid expensive litigation in assessing the amount of the damage which may then have been received. Thus, in specifications it is usual to state a sum to be paid by the builder to the employer, or deducted from the balance of account due in case the contract is not properly completed within a certain fixed time, both as a penalty for the neglect of the former, and as a remuneration for the disappointment of the latter. The sum, however, must be reasonable or the courts of equity will relieve. Thus it would be manifestly unjust to demand £1000 from a builder because his contract was not completed for £10 or by a single day. The courts will also require it to be proved that the employer has completed his side of the engagement, and has never failed in paying the instalments at proper times as agreed, and has not thrown difficulties in the way of the works, but has afforded all proper facilities. In certain cases where default has taken place by what lawyers call "the act of God", as unavoidable floods, tempests, lightning, etc., it is said the courts will relieve. CONTRACT; PENALTY; SPECIFICATION. A. A.

LIROIDENDRON tulipifera, the Tulip tree. In America where it is a native it is also known by the names, white wood, canoe wood, saddle tree, tulip bearing lily tree, Virginian poplar, and poplar. It has large four lobed truncated leaves resembling a saddle in shape. There are three varieties of it.

The Tulip tree is one of the most magnificent inhabitants of the forests of the temperate parts of North America. It sometimes attains a height of 120 ft. or more, when the trunk measures 10 ft. in circumference; the usual dimensions are 70 to 100 ft., and from 18 ins. to 3 ft. in diameter. In Great Britain, where it was introduced before 1688, many specimens have attained a height of 70 to 80 ft., with a circumference of 6 or 7 ft. The timber is seldom used in Europe, as the tree is too much valued by the landscape gardener; but in America it yields a light, compact, fine grained wood, of a yellow or nearly lemon colour, used by cabinet makers for furniture and for panels of doors, as it is often 2 or 3 ft. wide, besides being easily wrought and taking a good polish. The heart wood, when perfectly seasoned, long resists the atmosphere and is said to be rarely attacked by worms. When used in wide boards, it is liable to shrink and warp. The Indians of the west country prefer this tree for the construction of their canoes. An English specimen weighed 27 lbs. 2 oz. per cubic foot; another from the United States weighed 24 lbs. 3 oz.

The *L. t. obtusiloba*, having leaves with blunter lobes, is called yellow wood, or yellow poplar, on account of the colour of the wood. 14. 90.

LIS, see *FLEUR DE LIS*, and *LILY*.

LISBOA (Roman Felicitas Julia; Latin and It. Lisbona; Fr. Lisbonne; Ger. Lissabon; Eng. Lisbon). The capital (since cir. 1400) of the kingdom of Portugal. It is beautifully

situated where the river Tajo (Tagus) spreads into a lake. The harbour or roadstead is one of the finest in the world; commodious quays extend from two to three miles along the river, at about nine miles above its mouth. The town itself is about $3\frac{1}{2}$ miles long and 1 to $1\frac{1}{2}$ mile wide; the "lines" were formed in 1833. The whole of this space is not covered with buildings, considerable portions being occupied by gardens, ruins, and the declivities of the many hills, on a succession of which the city is built. The only bridge requiring notice is that over the Alcantara stream, having a fine statue of S. John Nepomucene, by Padua, erected by queen Marianna. The castle of S. George, a small building, occupies the site of the Moorish city. The bishopric was founded 1147, and made an archbishopric 1394.

The streets in general, especially in the eastern, or oldest, portion, are steep, narrow, crooked, wretchedly paved, and filthy: while the houses, with few exceptions, are old-fashioned and mean. The portion rebuilt since the earthquake of 1st November 1755 lies on level ground, and consists of eight or nine parallel streets crossed by others at right angles, which are regular, well-built, and kept clean. The houses are formed of a framework of wood filled in with stone and brick, the better to resist slight earthquakes (MURPHY): they are designed in an Italian style and are generally of a dazzling whiteness. It was noticed that in general, during that great earthquake, the most solid buildings fell first; and that while all the buildings in the valley were destroyed, the houses built on the declivities of the hills were spared.

The *rua das portas Sta. Catharina* is shown in the *ILLUSTRATED LONDON NEWS Journal*, 1846, viii, 396; and another street, in MURPHY, pl. 5. The *praça do commercio*, 585 ft. long by 536 ft. wide, or 615 by 550, has public buildings on each side except the south, which is open to the river; in the centre is a bronze equestrian statue of king José I (1750-77) about 21 ft. high, erected 1775 by J. Machado de Castro; the pedestal is 21 ft. high, 18 ft. long and 12 ft. wide raised on an elevated base; B. de Costa founded the statue in one piece. The *praça da Figueira*, which is remarkably picturesque in appearance, is used as a public market place. The *praça do Rocio* or *de dom Pedro* contains the national theatre erected on the site of the Inquisition. The *largo do Pelourinho*, with its pillar for executing criminals in the centre, shows the style of building immediately subsequent to 1755; it is given in BATTY. The *praça das Amoreiras* contains a large reservoir for supplying the numerous *chafarizes* or fountains, with water brought by an aqueduct, which is described *s. v.* ALCANTARA, and *s. v.* AQUEDUCT in *Detached Essays*, p. 17, pl. 3, fig. 3: this well known structure is reported in the *PENINSULAR CORRESPONDENT* (*ATHENÆUM Journal*, 24 July 1848, p. 113) to "have been pulled down with the triumphal arch of Trajan in order to use the stones for other purposes." Two other immense reservoirs were (1864) being formed. None of the buildings deserve special notice for their architecture, and few are in a complete state.

The churches are numerous; many of them are profusely decorated, and generally are not orientated. The ecclesiastical establishments crowning the hill appear like palaces and fortresses, being for the most part massive and imposing structures. The cathedral, *s. c.*, or basilica de Santa Maria, was rebuilt by king Affonso Henriquez after 1147; having been injured by an earthquake 1344 it was restored by king Affonso IV by whom the choir was rebuilt; king Fernando I rebuilt the west front (1367-83); it was restored after damage in 1755 and by fire. It is a moderate sized plain building with two low western towers; the interior is whitewashed and the capitals gilt. The church of S. Vicente de Afora, began to be rebuilt 25 August 1582-1629 by the Italian F. Trozo, entirely eclipses the cathedral; the west front is 100 ft. wide, 97 ft. high to the balustrade, and 147 ft. to the top of the tower; the interior is 222 ft. by 82 ft.; the vaulted roof is of black and white marble; the Braganza dynasty is buried in one of the chapels: its

monastery was one of the largest in Lisbon; since the Augustinian monks were transferred 1773 to Mafra it has been the residence of the patriarch. S. Antonio da sé is a moderate sized modern building. Sta. Engracia, intended to have the largest of all rotundas, had its first stone laid 1682, but is still unfinished. Nossa Senhora da Graça, rebuilt since its utter destruction 1755, is a lofty cruciform building without ailes, with a convent attached. Nossa Senhora da Monte, rebuilt 1243 was ruined 1755. Nossa Senhora da Penha da França, built 1597, was rebuilt 1625. The basilica do Coração de Jesus, commonly called the *Estrella*, the most conspicuous in the city, is built on the model of S. Peter's at Rome; it was commenced 1779 and completed 1796, and with the monastery cost the enormous sum of 16,000,000 crusados; the west front is over decorated with statues; the interior is richly decorated with coloured marbles; and it has a stone dome. S. Roque has a plain exterior; the roof was placed about 1582 by F. Trezo, with Prussian timbers, each beam being 80 ft. in length. This edifice contains the wonderful chapel of São João Baptista, erected by king José (1750-77) or king João V (1706-50) as usually stated, by whose orders the design and materials were prepared in Rome, completed and erected, taken to pieces, packed up and sent to Lisbon, where it was again erected on the north side of the church; although only a moderate sized recess in size (about 17 ft. by 12 ft.), it is said to have cost either 14,000,000 crusados, over 5,000,000 reis, or £1,100,000 sterling; the walls, roof, and pavement are of rich marbles, the columns of lapis lazuli, the candelabras of silver gilt, with mosaic, rich metal works, and other decorations: an unique folio volume, lettered "Patriarcale. Lisbon. mccccv", and belonging to J. Weale, the publisher, was the "Book of Sketches of the Designs of Works proposed which are being made in Rome by order of the Court;" it is described by J. W. PARRY, in *WEALE, Quarterly Papers on Architecture*, 4to., London, 1843-4, i, (pp. 32) and ii; and the gates are also given in *BUILDER Journal*, 1850, viii, 42; the architect's name is not known; the estimated sums amount to £111,818:9s. S. Domingos is a modern church, the largest in the city. Nossa Senhora dos Martyres, in the most ancient parish, is a modern building. Nossa Senhora de Loretto, rebuilt after 1755, is the fashionable church of the city. The Conceição Velha, formerly a synagogue, pulled down 1755 except the rich flamboyant façade designed by João Potassi (supposed to be the same as BOYTACA), is disfigured by recent restorations. Santa Maria Magdalena has a modern body with a good and rare Flamboyant west door. S. Julião, rebuilt 1755, burnt 1816, was rebuilding in 1864 with a rich marble interior. The Carmo, properly Nossa Senhora do Vencimento, in ruins, is perhaps the most interesting of the churches; it was founded 1389, ruined 1755, and burnt; it is 160 ft. long, with a tower worth careful examination; the outer walls and façade remain tolerably perfect; the piers and arches of the nave exist, but the vaulted roofs of the nave and ailes are gone; the chancel roof remains: the works of the extensive monastery, now a station of the municipal guard, were executed in the first half of the fifteenth century by the Eanes, Anes or Annes. Nossa Senhora das Mercês was formerly the convento de Jesus. São José, or the Memoria, at Belem, was built 3 Sept. 1760. The collegio dos Inglezinhos, founded 1628, is an irregular pile of various dates. The Dominican monastery and college for Irishmen, founded 1659, was rebuilt after 1755; and the Bridgetine convent for English nuns, successors of those driven from Sion house near London, was rebuilt after 1755. There are two public cemeteries and an English one.

The church and Hieronymite monastery of Belem is a magnificent structure; the first stone was laid 1500 from designs by João Potassi (or BOYTACA); when the centres of the vaulting were struck it gave way; during the rebuilding the architect fled, but the vaulting remaining firm, the architect returned; his bust is sculptured on the first column of the gospel side.

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The whole building is erected on piles of pine, and scarcely suffered from the great earthquake. There is a rich south porch; the nave and transepts are in the Flamboyant style; the piers and arches of the gallery to the *coro alto* are highly carved. The arrangement of the transepts is singular, there is a kind of vestibule between the choir and the nave which would at first sight be taken for them, whereas they really form dwarf excrecences at its extremity; the choir built by Catherine wife of king João III is later and classic Roman in style. The tomb of its founder king Manoel (1495-1521), and that of king João I (1383-1433) and their wives, are plain sarcophagi supported on elephants. The cloisters are considered inferior only to those of Alcobaça and Batalha. A model of the building showing the completion proposed by J. da Silva was prepared for the Exposition Universelle at Paris 1867. The edifice is now occupied as a hospital.

The palace of Necessidades was inhabited by the late sovereigns; a view is given in the *ILLUSTRATED LONDON NEWS Journal*, ix, 285. The palace of Ajuda near Belem, was designed for king João VI by F. X. Fabri, who died 1807 and was succeeded by A. F. Rosa; M. C. Guido was engaged upon it in 1827; a third part of the whole was only completed in 1821-22 and later: the apartments 1862-65 were rearranged and redecorated for the present sovereigns. The royal palace of Belem is very irregularly built. The suppressed convent of S. Bento has been occupied by the chamber of peers since 1838, but by the cortes since 1834; the cells of the monks, which were tolerably spacious rooms, are used by the committees: the *torre do tombo* or public record office is held in the same building. The exchange dates from 1755, as does also the custom house or *alfandega*, of two stories surrounding a court (given in *MURPHY*, pl. 6): also the India house: and the naval arsenal, erected on the site of the royal palace; the chief room is about 250 ft. long, 65 ft. wide, and 50 ft. high. The *arsenal do exercito* or *fundação* dating from 1760 serves as a military magazine. The national library in the convent of S. Francisco, contains nearly 260,000 volumes. The *academia das bellas artes* is held in the same monastery, the chapel of which was designed cir. 1525-40 by J. de Castilho. The *museu real* occupies the suppressed monastery of the Jesuits; the polytechnic school adjoining, has had more than £20,000 expended on its erection. The *seminario* was completed after 1755 by J. Azzolini. There are five theatres; that of S. Carlos, or the Italian opera house by J. da Costa e Silva, was erected 1792-3 in five or six months: the new national theatre of Donna Maria Segunda was erected 1843-45 by — Lodi, at a cost of £50,000; the native Lioz stone was used; *CIVIL ENGINEER*, etc., *Journal*, 1845, viii, 384; (a view in *ILLUSTRATED LONDON NEWS Journal*, vii, 333); it is not well constructed for hearing, and the rain falling on the zinc roof causes much noise: the *gymnasio* dates 1852; and the theatre of dom Fernando was built 1849: the *circo dos touros* 1831 of timber, for the exhibition of bull fights, will hold many thousand persons.

The hospital of S. José, a vast building, was completed for the Jesuits 1593 and called the collegio de S. Antonio; as the earthquake destroyed the vaulted roof and one of the towers, it was converted into a hospital 1775, for which it is admirably adapted for about 900 patients. The other chief structures are, the marine hospital 1797 for 400 patients: the *real casa pia* now located in the convent of S. Geronimo at Belem, for about 900 children of both sexes; the library of the convent is now the drawing school; the stone vaulted refectory, still used for the same purpose, has the lower part of the walls lined with *azulejos*; the sacristy, having a carved central shaft in the Flamboyant style, is shown in *TAYLOR*: a hospital for 60 persons: the Santa Casa di Misericordia, near the church of S. Roque, an immense establishment, having a founding hospital, built by king Manoel at the beginning of the sixteenth century: and the lunatic hospital. A hospital for children designed by J. M. Rogers of London under the superin-

tendence of A. J. Humbert, Dr. Sutherland, and Miss Nightingale, 1861, is given in her work on *Hospitals*, p. 11. The *limocero* prison, a large irregular building, was formerly a palace.

Near fort S. Julian is a lighthouse rising 120 ft. above the sea; and near fort Bugio is another 66 ft. high. At Belem, or Bethlehem, is the well-known picturesque *torre de S. Vicente*, erected in the reign of king Manoel (1495-1513), as one of the defences of the harbour; a good view is given in BATTY; and in VIVIAN, *Scenery of Portugal*, etc., fol., Lond., 1839, with other views of this city. 28. 50. 96.

Map of Lisbon, No. 183, published 1833 by the Society for the Diffusion of Useful Knowledge; *Description de la ville de L.*, 12mo., Paris, 1730; *Itinerario Lisbonense*; CORREIA DA CUNHA, *Lisbon Guide*; *Novissimo* (sic) *Guia de L.*, 16mo., Lisbon, 1863; MURPHY, *Travels in Portugal*, 4to., London, 1795; LINK, *Travels in Portugal*, transl. by Hinckley, 8vo., London, 1801, p. 165; TAYLOR, *Voyage en Espagne*, 4to., Paris, 1826 43; KINSEY, *Portugal Illustrated*, 8vo., London, 1828; J. E. ALEXANDER, *Sketches of Portugal*, 8vo., London, 1834; BATTY, *Select Views*, fol., London, 1832.

LISBON (MASTER ROBERT of), see COIMBRA.

LISBURN (originally Lisnagarry, Lisnegarvey). A market town, in the counties of Antrim and Down, in Ireland. It is situated on the river Lagan, over which is an old bridge; and is in general well built, the houses in the main street being chiefly erected of English brick; it has a clean appearance, and is well supplied with water. The castle or fortified mansion was built 1610 or 1627 by Lord Fulk Conway, and around it the town was formed; a great portion of both was destroyed by fire in 1707; the castle has not been rebuilt, but the grounds have been formed into promenades by direction of the marquis of Hertford. The see was joined to the united dioceses of Down, Connor, Dromore, and others, 27 October 1662.

The cathedral, also used as the parish church, is a spacious edifice with a lofty tower and octangular spire. There is also a chapel of ease; a Roman catholic cruciform chapel with a west tower connected by a vestibule with the building; several meeting houses, and schools; the county Antrim infirmary; a fever hospital; an union poor house; a market house containing the assembly rooms, with a tower of three stories; a manor court house; a linen hall; an almshouse for fourteen females; and a savings' bank built 1838. LAWSON, *Gazetteer*, 8vo., Edinburgh, 1842; LACY, *Sights*, etc., 8vo., Lond., 1863, p. 312. 14. 28. 50.

LISIER (SAINT), see LIZIER (SAINT).

LISIEUX (the ancient Neomagus, Noviomagus, or Lexovium). A town, in the department of Calvados, in France, and situated on the river Touques at its junction with the Orbec. It is ill built; the houses though lofty are of wood and have generally a decayed and gloomy look; a rich example of one of the sixteenth century is given in VERDIER and CATTOIS, *Architecture Civile*, etc., 4to., Paris, 1857, ii, 120: the streets are narrow and winding. The site of the old walls is occupied by buildings and promenades. The (former) cathedral, now a parish church, is dedicated to S. Pierre; it is stated to have been burnt 1136, rebuilt 1141-82, and again burnt 1226. The choir was rebuilt or enlarged 1226-53 when the three chapels round the apse were founded, the central one was rebuilt and enlarged for the lady chapel in the fifteenth century by bishop Pierre Cauchon, whose curious expiatory tomb still remains. The nave (1160-82) is one of the best examples in Normandy of the latest phase of the transition from the Romanesque to the Gothic style (PARKER, in *Sessional Papers* of the Royal Institute of British Architects, 1865-66, p. 89): "the church throughout, and in the closest manner, resembles Early English work," WHEWELL, *Tour in Picardy*, etc., in *German Churches*, 8vo., Lond., 1842, p. 275-8. The dogtooth molding though introduced in this building is but sparingly employed. The western façade with its two dissimilar towers, the south one having a spire, is given in CHAPUY, *France Monumentale*, fol., Paris,

1842, pl. 86: one of them is said to have been rebuilt (MURRAY). The church of S. Jacques has some good painted glass. There is also an episcopal palace now the *sous-préfecture*, with its fine gardens; a theatre; a seminary for the clergy; and a great hospital. INKERSLEY, *Romanesque*, etc., *Architecture in France*, 8vo., London, 1850, p. 19, 81, 263-5; Du Bois, *Histoire de L.*, 8vo., Lisiens, 1845. 14. 28. 50.

LISLE, see LILLE, in France.

LISLE (PASQUIER DE), or Delisle Mansard, see DE L'ILE (P.).

LISMORE. A town in the county of Waterford, in Ireland; in the seventh and eighth centuries it was the "ecclesiastical Athens" of that country. It is situated on the river Blackwater, which is crossed by a stone bridge of one arch, 109 ft. span, with three or four smaller arches supporting the approach erected 1812-29 by the then duke of Devonshire, at a cost of £9,000. The castle, said to have been erected 1185 by king Henry II, or John earl of Morton, for ages remained the residence of the bishops, until 1518, when it was granted to sir Walter Raleigh, and now belongs to the duke of Devonshire; in 1643 it was greatly injured during a siege, in 1645 by a fire, when it was rebuilt; since 1853 it has been restored by sir Joseph Paxton and G. H. Stokes, under the inspection of J. Browne, and decorated by Messrs. Crace; in Oct. 1855 the foundations were laid of Carlisle tower, one of a series, and intended to be 170 ft. high; BUILDER *Journal*, xiii, 492; a view is given in the *Building News Journal*, 1858, iv, 38. The see founded cir. 636 was united with that of Waterford in 1863, and 1833-34 annexed to Cashel and Emly.

The cathedral, now the parish church, dedicated to S. Mocho, or S. Carthagh, was in a plain Early English style, repaired 1190, but was almost rebuilt 1663 by the earl of Cork; great additions were made in the nineteenth century; it has only one transept; the walls are of sandstone resembling Portland stone, the spire of white limestone; the old oak fittings still exist; the choir contains some stained glass. Among the other buildings are, a large Roman Catholic chapel; a presbyterian meeting house; a convent of the Presentation; numerous public and private schools; a sessions court and bridewell forming one building; and an hospital. WRIGHT, *Ireland Illustrated*, 4to., London, 1829; WALCOTT, *Caths. of the United Kingdom*, 8vo., London, 1860, p. 320; CROKER, *Researches*, 4to., Lond., 1824, p. 125 giving the castle and bridge; LAWSON, *Gazetteer*, 8vo., Edinburgh, 1842. 14. 28. 50.

LISMORE. An island in the see of Argyre, in Scotland, nine or ten miles long and about two miles broad. It was separated from the see of Dunkeld in the thirteenth century. The cathedral is dedicated to S. Moulac; the choir, in the Flamboyant style, alone remains; it was newly roofed 1749, after the walls had been lowered from ten to seven feet. It is 60 ft. long, internally 52 ft., and 30 ft. wide. The sedilia have semi-circular arches; and at the east end of the north wall is a sharply pointed door leading to the sacristy; WALCOTT, *Caths. of the United Kingdom*, 8vo., Lond., 1860, p. 362. The walls of the castle of the early bishops of Argyre and the Isles are still to be seen about four miles to the west; a square internal court still remains. About half a mile from the cathedral is one of the "duns," or Picts' houses, a circular tower built without mortar; FORSYTH, *Beauties*, etc., 8vo. Edinburgh, 1808, v. 507. A Roman Catholic college for priests existed in Lismore a few years since. 50.

LISS. The Irish term (sometimes written lios), which has descended to the present time in such names as Lismore and Listowel, for one sort of fortress that was perhaps inferior to the *rath* merely on account of magnitude: "while some habitations were anciently called *cahirs* or *cashels*, which were always of stone, the *raths* or *lisses* were invariably composed of earth, as they exist chiefly in the plains; *duns* or hill fortresses being generally of stone, but occasionally of earth"; WILDE, *Catalogue of Antiquities*, 8vo., Dublin, 1857, p. 99.

LIST. A straight upright ring encircling the lower part of a column, just above the torus, and next to the shaft. It is frequently used in the same sense as **LISTEL**, **FILLET**, and **SQUARE**. 4.

LIST. A Gloucestershire term for a course or layer. A "list wall" (a common mode of building a field boundary), consists of layers in which a foot of dry walling without mortar, alternates with a foot of walling with mortar.

LISTED BOARD. A board cut to a parallel width, the object being to get all the boards of an equal width, as well as to "list off" the sappy edges. A. A.

LISTEL. A little square band serving to crown or accompany a larger molding, or to separate the flutings of a shaft of a column. It is also called a **FILLET**, and sometimes a **LIST**, being derived from the It. *lista*, any kind of list or selvage. **GUTTÆ BAND.** 4.

LISTING. The operation of bringing boards to a regular width; this is now generally performed by machinery at the saw mills. In the case of floor boards, it is better not to shoot them, but to leave the edges rough from the saw curf, as they make a closer joint. A. A.

LISTOWEL. A town in the county Kerry in Ireland, possessing good quarries of limestone, with chert, of which the bridge there is built. The stone is of a blueish grey colour, and dense close-grained semi-crystalline character, with large crystalline fragments and fossils. It weighs from 168 lbs. to 175½ lbs. per cubic foot in a dry state, according to the bed from which it is obtained; these beds vary from 15 ins. to 3 ft. in thickness. Experiments as to its strength are given in **WILKINSON**, *Practical Geology, etc., of Ireland*, 8vo., Lond., 1845, p. 349.

LITANY DESK. A low moveable desk from which the litany is read, placed at the eastern end of the nave of a church outside the entrance to the chancel; in cathedrals it is placed in the middle of the choir. It ought to be covered with a hanging or embroidered carpet, which may either quite envelope it, or merely cover the bookstand, or depend in front. The injunction of queen Elizabeth, xviii, 1559, states, "The priest goeth from out of his seat into the body of the church, and (at a low desk before the chancel door, called the fald stool) kneels, and says or sings the litany": **ECCLESIOLOGICAL SOCIETY**, *Instrumenta Ecclesiastica*, 4to., Lond., 1844-47, 1st series, pl. 17 and 23; and 1850-56, 2nd series, pl. 35. It is said that no really ancient example exists; but one in Wells cathedral is given in detail, as a genuine example of the fifteenth century, in **BUILDER JOURNAL**, 1846, iv, 403.

LITHARGE (Lat. *lithargyrum*; It. *litargirio*; Sp. *almar-taga*; Fr. *litharge*; Ger. *bleiozyd*; *glütte*). A protoxide of lead, known to the ancients, and so named by them from its containing shining particles resembling silver. It is very readily obtained by passing a current of heated air over the surface of lead in a molten state; which speedily becomes covered with a yellow powder much resembling small scales, called **MASSICOT**. If the heat be raised to a bright red, any metallic lead is separated, the oxide is then fused, and becomes a mass readily separated into scales. Those specimens which contain a small portion of the peroxide (**RED LEAD**; **MINIUM**) look yellow, and are called **gold litharge**; the whiter are called **silver litharge**. It contains carbonic acid, especially when exposed to the air for some time.

Litharge is chiefly used for decorative purposes as a **DRYER** with boiled linseed oil; the subacetate of lead known by the same name is used with poppy oil. Litharge has a remarkable affinity for oil as well as for white lead, reducing it to a solid, or drying up the former, in a very short time. A. A.

It is most conveniently prepared by heating the carbonate to dull redness: common litharge is impure protoxide which has undergone fusion. Protoxide of lead has a delicate straw yellow colour, is very heavy, and slightly soluble in water. At a red heat it melts and tends to crystallise on cooling. In a

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melted state it attacks and dissolves siliceous matter with astonishing facility, often penetrating an earthen crucible in a few minutes; **FOWNES**, *Manual*, 12mo., London, 1861.

LITHIC CEMENT. An artificial cement, hard as stone, with a face smooth as earthenware, was invented at Manchester in 1841 (**CIVIL ENGINEER**, etc., *Journal*, v., 28) by Messrs. Evans and Nicholson, "with the very same ingredients, and in the same proportions nearly, that were used in the author's experiments, but the most important of which is obtained in a roundabout manner from the residual matters or waste of certain chemical works, instead of working with natural substances", according to **PASLEY**, *Lines*, etc., 2nd edit., 8vo., London, 1847, pt. 1, p. xiii.

LITHIC PAINT. A composition or pigment containing pounded stone, or sand. The best of this class of protecting applications called **ANTI-CORROSION**, contains a quantity of pulverised glass. Painters do not like these pigments, as they entail a great deal of labour, cut brushes to pieces rapidly, and endure much longer than ordinary work. A. A.

LITHOCHROMY. The term used in 1837 by Leo von Klenze for what is now generally called polychromy. The monopteral temple at Munich was claimed by him as "the first example in the present day." **KLENZE**.

LITHOLOGY. The scientific description of stones used for building purposes. As the qualities of stones, marbles, etc., are given in this work under their respective heads, as **GRANITE**, **MARBLE**, and others, it is unnecessary to state more here than the titles of the several works treating generally on the subject.

Report of the Commissioners appointed to Select Stones for the Houses of Parliament, fol., London, 1839; new edition, 1845. Partly reprinted in **GWILT**, *Encyclopædia of Architecture*, 4to., London, 1842; new edit. 1867.

C. H. SMITH, *Lithology, or Observations on Stone used for Building*; treating chiefly of the Magnesian limestones of Yorkshire, Derbyshire, and Nottinghamshire, with reference to the selection of stone for building the exterior of the new houses of parliament; read at the Institute of British Architects, 29 April and 3 June 1844; printed in **WRALE**, *Quarterly Papers on Architecture*, 4to., London, 1845.

Memoirs of the Geological Survey, etc.; Mining Records; Mineral Statistics of the United Kingdom of Great Britain and Ireland, Part 11 for 1858, by R. Hunt, 8vo., London, 1860. This work gives a nearly complete list, etc., of all the stone quarries; and p. 131, the "Weights per cubic foot of many of the Building Stones named in the Returns." This list was also printed in the *Sessional Papers* of the Institute of British Architects, 4to., London, 1860.

WILKINSON, *Practical Geology and Ancient Architecture of Ireland*, 8vo., London, 1845.

KNIGHT, *On Colonial Building Stones*, read at the Victorian Institute of Architects, 1859; printed in **BUILDER JOURNAL**, xviii, 579.

BRARD, *Traité des pierres précieuses, des porphyres, granits, marbres, albatres, et autres roches propres à recevoir le poli et à orner les monumens publics et les édifices particuliers*, etc., 2 vols., 8vo., Paris, 1808.

BROCCHI, *Dello Stato fisico del Suolo di Roma*, 8vo., Rome, 1820.

CORSI, *Catalogo ragionato d'una collezione di pietre di decorazione, formata e posseduta in Roma, dell' avvocato F. Corsi*, 8vo., Rome, 1825; 1833.

CLARAC (Comte de), *On the different Materials employed by the Ancients for Statues, and on the Varieties of their Marbles*, as translated from the French, and given in **CIVIL ENGINEER AND ARCHITECTS' JOURNAL**, 4to., London, 1839, ii, 367, 434, and 452.

LITHOSTROTUM (**OPUS** or **PAVIMENTUM**; sometimes incorrectly written *lithostratum*, being the Gr. *λίθοστρωτον* from *λίθος*, stone, and *στρωτός*, spread or laid out as a cloth is drawn over a table). This term, used in its original language by

HESTON and SOPHOCLES, and in Latin by CICERO and PLINY, would have remained unintelligible as a technical word, if the latter author *II. N.*, xxxvi, 25, had not written the following passages; "pavimenta originem apud Græcos habuit elaborata arte picturæ ratione donec lithostrota expulere eam: celeberrimus fuit in hoc genere Sosus qui—fecerat parvis e tessellulis tinctis in varios colores", "the unswept floor" and (probably) the "doves drinking and preening themselves": these seem to be cited as specimens of work *picturæ ratione*, executed in that method of cubes and prisms, which is practised as Roman mosaic work. A little onward, the same author states, that "lithostrota acceptavere (or ceptavere) jam sub Sylla parvulis certe crustis exstat hodieque quod in Fortunæ delubro Præneste fecit," which equally evidently indicates that this example was executed in that method of slices, which is practised as Florentine mosaic work. As noticed by NIBBY, *Viaggio*, 8vo., Rome, 1819, i, 294-8, commentators have overlooked PLINY's discrimination between *tesserae* and *crustæ*, and have erroneously supposed that a celebrated pavement at PALESTRINA (which is made with cubes, was moved 1640 from its original position, and has not yet been correctly published) is the work mentioned by their author. The assertion that the λιθολόγημα of ΞΕΝΟΦΩΝ, *Cyrop.*, vi, 3, means the *opus lithostrotum* as above defined, still requires investigation.

LITMUS BLUE, see LACHMUS BLUE.

LITTER BOARD. In stable fittings a board, which is placed under the manger, and behind which the grooms in the morning place the straw of the bed of the horse. It should be formed of oak and well stayed up. A. A.

LITTLE (THOMAS), was born February 1802; and became a pupil of Robert Abraham. In his early life he practised also as a surveyor, afterwards solely as an architect, and later was much appealed to as an arbitrator. The following list comprises his more important designs. 1843 rebuilding of No. 1 Princes-street, Leicester-square, for R. Sampson, esq.; 1845-6 All Saints' Church, Finchley New-road, St. John's Wood, for 1,300 persons, at a cost of £7,000; described in *CIVIL ENGINEER*, etc., *Journal*, ix, 266; and a view in *BUILDER Journal*, iv, 366: 1844 chapels at Nunhead cemetery, Peckham (laid out 1838 by J. B. Bunning), at a cost of about £6,000, having gained the first premium of £100; a view in *COMPANION TO THE ALMANACK*, 8vo., London, 1845, p. 235; 1845-6 new studies for the Civil Engineers' college at Putney: 1847 college in St. John's Wood Park, for rev. John Fletcher at a cost of £4,395: 1847 parsonage at Upper Norwood for rev. E. Harden: 1847-8-56 works in Spur-street and Leicester-square on the estate of John Aug. Tulk: 1848-9 enlargement and restoration of Willesden church; 1852 rebuilding south aisle, extension of nave, etc.: 1850 school and cottages at Walberton, Sussex: 1850-1 bishop Duppa's almshouses at Richmond in Surrey, 10 houses £1815 (the old building erected 1661, is given in *BUILDER Journal*, vii, 259): 1851-4 St. Mark's church, Albert-road, Regent's Park, for 1,260 persons at a cost of £6776, subsequently added a new aisle, and presented to the parish of St. Pancras the land on which it stands: 1852 additions at Chislehurst, Kent, for Herbert Jenner, esq.: rebuilding No. 7 Charles-street, Berkeley-square, for T. T. Clifton, esq.: 1854-5 laying out the grounds, with the chapels of the Paddington cemetery, Kilburn-lane; view in *BUILDER Journal*, xiii, 492-3: 1855 S. Paul's church, Warwick-road west, Maida-hill, at a cost of £10,130: 1856 S. Saviour's church, Warwick-road west, for 1,670 persons, at a cost of £11,000, it was erected in twelve months; described in *BUILDER Journal*, xiv, 234: 1857 new (adjoining) premises for the Westminster assurance office, King-street, Covent Garden: the houses and manufactories for Messrs. Gillow, No. 176 Oxford-street; and the new ones for Messrs. Collins and Duppa, No. 314 Oxford-street: the church of Fairlight at Hastings; the mansion No. 13 Hyde Park-gardens, for Asheton Smith, esq.: and 1859 girls' and infants' schools in rear of the parish church in Marylebone-road. He

died 20 December 1859, and was buried in Paddington cemetery, a memorial window was subsequently placed in the chapel there; *BUILDER Journal*, xvii, 855; xx, 140. Many of the original drawings for the above works are now in the library of the Royal Institute of British Architects.

LITTORAL CONCRETE. A variety of rock so-called from its being invariably found close to the sea-shore at Bombay, and from its resembling artificial stone; *BUILDER Journal*, 1850, viii, 386.

LIVEHOLE. The term given to the opening formed like a square drain under the "upright" of a clamp prepared for burning bricks. It is filled with coals and wood being intended to expedite the combustion of the breeze. BRICK, p. 139. A. A.

LIVERPOOL. An important seaport town in the county of Lancashire, in England, situated on the river Mersey, and one of the largest commercial towns in the world. A locality in the southern part, called Smithdown, is supposed to be identical with *Smedone* which is mentioned in the Domesday Book; the first direct notice of the place is in a charter of king Henry II, 1173, where it is styled *Lyrrpul*; and in the charter granted 1207 by king John it is named, as at present, *Liverpool*. Its history is that of commerce; there are very few manufactories; and not being either a capital or a cathedral city, a minute description of it does not come within the scope of this work. Of the buildings, which are all of modern date, must be mentioned the noble edifice, St. George's hall, one of the grandest architectural edifices in Europe, designed 1841 by H. L. Elmes in the Anglo-Greco-Corinthian style, continued by R. Rawlinson, and completed by C. R. Cockerell, R.A.; it is described in this work s. v. Elmes; and in the *BUILDING CHRONICLE*, i, 83, 213: *BUILDER Journal*, xiii; xxi, 868, 895; *CIVIL ENGINEER Journal*, vi, 329; 1864, 136: and *COMPANION TO THE ALMANACK* for 1842. The following publications are named as affording the usual information, besides the *ENCYCLOPÆDIAS*; the *BUILDER*, *BUILDING NEWS*, and *CIVIL ENGINEER*, etc., *Journals*, passim; AUSTIN and PYNE, *Lancashire Illustrated*, 4to., Lond., 1831; BAINES, *History*, etc., of *Lancashire*, 4to., London, 1836: THOMSON, *Stranger's Vade Mecum or Liverpool described*, 8vo., Liverpool (1854); MURRAY, *Handbook for England*. 14. 50.

Reference should also be made to the names herein of deceased local architects, as ELMES, FOSTER, HOLME, and others. The Liverpool Health Act, 5 Vict. sess. ii, 1843, was framed by Mr. W. Tate of London, and Mr. Stewart of Liverpool; LOCAL GOVERNMENT ACT. The building stones of the locality, exhibited in 1851, are noticed in *BUILDER Journal*, ix, 716.

LIVINGSTONE (JOHN and ROBERT), see LEVINGSTON.

LIVORNO (Fr. Livourne; Engl. Leghorn). An important commercial city and seaport of Tuscany, in Italy. Though mentioned in the eleventh century, it was 1279 only a village without walls. The docks were formed by the Florentines after 1421, in which year the place was exchanged by the Genoese for the unimportant place of Sarzana through the influence of Cosmo di Medici, the "Vecchio" (1429-64): it increased under the fostering care of the first grand duke Cosmo I. (1537-74) and his successors. It is situated on the river Arno; and is surrounded with walls, the first stone of which was laid 28 March 1577 by duke Francesco I. (1564-87); and has five gates: the *fortezza nuova*, with other fortifications, is by B. T. Buonatalenti; some have lately been pulled down. Though itself scarcely three miles in circuit, there are two large suburbs; one to the north being called *Le nuova Venezia*, from its being intersected by canals lined with warehouses (a plan and section of one are given in GRANDJEAN and FAMIN, *Architettura Toscana*, fol. Paris, 1815, pl. 107); the other to the south is called *borgo Cappuccini*. The piazza d'arme is a large public square in the middle of the town. The streets are wide, mostly straight and well-paved; many of the private houses are well designed and built; the palazzo Lardarel for count Lardarel, with a gallery for works of art, is one of the best modern edifices. Water is

supplied by the aqueduct of Colognole 1606, completed 1792. The outer mole, about a third of a mile in length, and the lighthouse on an island, were both formed under Cosmo I, who also opened the canal across the plain to Pisa. Near the *darsena* or inner harbour is a colossal marble statue of Ferdinando I, the benefactor of Leghorn (1587-1609), by Giovanni (Bandini) di Benedetto of Castello, or dell'Opera, with four colossal slaves in bronze at the base, the work of Pietro Tacca (after 1571). A new harbour under the lighthouse was being formed 1856 by — Poirel a French engineer. A statue of the late grand duke Ferdinand is in the new *piazza dei due principi*. The city is the see of a bishop; and is connected by railways with Pisa and Florence.

The duomo, formerly a parish church and of small size, dedicated to the Assumption of the Virgin and S. Francesco d'Assisi, was commenced to be rebuilt from the designs of G. F. Cantagallina (circa 1600); a plan is given in GRANJEAN and FAMIN, pl. 106: the façade has usually been attributed to Inigo Jones of England. The interior dimensions are about 184 ft. extreme length; the nave 59 ft. wide; the transepts 134 ft. 6 ins. long, and 34 ft. 3 ins. wide. The church of the Madonna, and that of S. Catherine of Siena 1704-16 "an unsatisfactory modern octagonal edifice, overdone with ornament, unfinished 1844" (WEBB, *Continental Ecclesiology*, 8vo., Lond., 1848, p. 365), with others, scarcely deserve notice. The English and Lutherans have chapels and burying grounds; the Greeks two churches; the Armenian church is said to have been built by T. Germain, circa 1700; the Jews have a richly decorated synagogue; and there is a mosque.

There are but few good structures to be seen: "Art does not exist in Leghorn," writes WILLIAMS, *Travels*, 8vo., Edinb., 1820, i, 196, "save in the alabasters in the via Grande, the enchainéd figures at the harbour, or the tombs of the campo santo." Among the large edifices for commercial purposes the *battini* or public oil warehouses are the most remarkable. Of the two theatres, one called the *Arena* rebuilt 1845 has, it is said, a glazed dome for day, as well as for night, performances (CIVIL ENGINEER, etc., *Journal*, viii, 140). The ducal palace of no great merit, is by G. F. Cantagallina, who designed "all the new civil and military works of the city." The *torre del marzocco* executed 1439 for the republic, is named from the lion as a weathercock with which it is surmounted, and also the *torre rossa* from its material of red marble. There are three lazarettos; S. Jacopo was erected 1643; S. Rocco 1604; and S. Leopoldo was building in 1778: this last is one of the best works of the class in Europe; they are remarkable for their excellent distribution and security, being surrounded by wet ditches, and supplied with warehouses and lodgings; HOWARD, *Account of Lazarettos*, 4to., Warrington, 1789, p. 7, gives plans of the two last of these buildings, pl. 7 and 8. *Raccolta delle più belle vedute della città e porto di L.*, fol., Leghorn, 1783. LALANDE (le François), *Voyage en Italie*, 12mo., Venice, 1679, ii, 516-35, pl. 1, which also gives a plan of the town. 14. 28. 50. 96.

LIVRE. An old French weight often quoted; it was equal to 489.51 gramme=7554.19 English grains, or 17.26672 ozs. or 1.07917 lbs.

LIZARAN (JUAN DE) and A. de Mendeaca, were engaged 1573 to enlarge the parish church of Sta. Maria at Segura, in the province of Guipuzcoa, in Spain. 66.

LIZARDI (DON PEDRO IGNACIO DE), with M. de Salezan, designed and began 1743 the parish church of Sta. Maria at San Sebastian, in the province of Guipuzcoa, in Spain. It measures 232 ft. by 119 ft., and has a dome and two towers. On his death at Ferrol, the church was completed and finished 1764 by F. Ibero. 66.

LIZARGARATE (PEDRO DE), a Biscayan, succeeded 30 October 1609 to P. Garcia de Mazuecos as *aparejador* at the Pardo, at Aranjuez, and the alcazar of Madrid; he was appointed 18 March 1611 his successor as *maestro mayor* of the works of the Order of Santiago at Uclés, in Castile, where he

was succeeded by A. Carbonel, but all had to follow the designs left 1576 by G. de Vega. He was sent 1613 as *aparejador* to the alcazar of Toledo, where, under J. B. Moncogro, but from the designs of J. de Herrera, he finished 1620 the corridor preceding the staircase and the two towers of the southern façade; and was appointed 12 September 1620 with the same rank to carry out under J. B. Crescencio the masonry from designs of J. Gomez de Mora for the *panteon* of the Escorial. He was not merely a practical man, for the translation by F. de Praves of the first book of Palladio's work shows, in the license for publication, that he had compared it with the original, 18 January 1625. He died 1629. 66.

LIZIER or LISIER (SAINT). A former episcopal city situated near S. Giron, in the ancient Couserans in the Pyrenees, in the département de l'Arriège, in France. The walls are constructed of Roman antiquities, which are also to be seen in the walls of one of the cathedrals dedicated to the Virgin; the other was dedicated to S. Lizier until 1680. The large episcopal palace was afterwards used as an hospital. A good stone bridge of three large segmental arches crosses the river Salat. A view is given in MELLING and CERVINI, *Pyrenées*, fol., Paris, 1826-30, p. 109, pl. 49.

LLAMA (ANTONIO DE LA), was one of the twelve architects who reported 13 September 1694 on the execution by F. Gomez Septier of the church of S. Salvador at Seville on designs made by J. Granados after the accident 24 October 1679. 66.

LLANDAFF (Welsh, Llan Tâf, church of the Taf). An ancient city in Glamorganshire in South Wales, now of very small size and is situated on the river Taf. The cathedral dedicated to SS. Peter and Paul, was first erected by bishop Urban 1120 or 1129: the present nave, and aisles first begun circa 1180-90, have an arcade of six bays of Early English architecture; in the west façade is a peculiar Early English doorway with a round arch under which are two semi-arches supported by a dropstone acting as a keystone. The choir is formed by two bays without any architectural division; a lofty arch separates the last from the presbytery (circa 1370) which has two bays. A fine Norman stilted arch (part of the first church) divides the latter from the lady chapel (circa 1265-87) which is of early Geometric character of five bays, vaulted with stone. To the south of the presbytery is the chapter-house, a square building with a central shaft and quadripartite vaulting of Early English work. The altar screen dates about 1370. The north-west tower in the Perpendicular style dating 1485 was erected by Jasper Tudor, created duke of Bedford 1435. In 1703 and 1720 the building was injured by storms, but in 1717 it was almost perfect; in 1722 the roof and floor of the south tower fell in and destroyed much of the church; in 1724 efforts were made to repair it, and 1735-6 John Wood of Bath commenced the works, which continued for many years. The restoration of the building, partly used as the parish church, was commenced 1843 by T. H. Wyatt and John Prichard, and the works were subsequently carried on by them and J. P. Seddon (as Mr. Prichard's partner); the works up to 1857 consisted of the restoration of the lady chapel, the rebuilding of the presbytery, and some minor works, at a cost of about £8,830; BUILDING NEWS, iii, 449. Subsequently the nave and aisles were restored and other works executed to the value of nearly £1000 by Messrs. Prichard and Seddon; since which the chapter house has been restored and the north tower completed with enriched parapet and pinnacles, and the south tower and spire are now (1868) in course of erection by J. Prichard, their cost will be about £8000. The structure is internally 243 ft. long and 65 ft. wide; the lady chapel is 58 ft. long, 25 ft. wide, and 36 ft. high. The deanery, resident canon's house, and two minor canon's residences, were designed by E. Christian for the Ecclesiastical Commissioners, at a cost of about £10,000. The workmen's cottages erected for Messrs. C. de Berge and Co., at a cost of £105 each, are given in the *BUILDER Journal*, 1866, xxiv, 885. There are also the remains of the episcopal

palace; and the national school, designed by J. Prichard for £900, given in the *BUILDING NEWS JOURNAL*, xiv, 1867, p. 510; who also designed 1861 the probate registry office, at a cost of £1000; a view in the same *Journal*, p. 6.

WYATT, *History, etc., of the Cath.*, read at Inst. of Brit. Archts. 20 March 1848, given in *CIVIL ENGINEER*, etc., *Journal*, xi, 141; and *BUILDER JOURNAL*, vi, 182, 211: FREEMAN, *Remarks on L. Cath. with an Essay*, 8vo., Tenby, 1850; a plan with description by him is given in the *ARCHÆOLOGIA CAMBRENSIS*, 8vo., London, 1850, i, new series, 108-34; and a memoir by W. D. CONYBEARE, p. 24-40; the plan is also given in *Journal* of the ARCHÆOLOGICAL ASSOCIATION, 8vo., London, 1855, x, 303: WINKLES, *Cathedrals*, 8vo., London, 1812, iii: *Some Account of the Condition of the Fabric, 1575-1857* (by the bishop of L.), 8vo., London, 1857; 2nd edit. 1860: notes in *BUILDER JOURNAL*, xv, 298; 349: xviii, 158, 547; xix, 663. *WELSH MANUSCRIPT SOCIETY, Liber Landavensis*, transl. by Rees, 8vo., Llandovery, 1840: MURRAY, *Handbook to S. Wales*.

LLANGOLLEN. A town in Denbighshire in North Wales, situated in a vale of the same name, whence a good building stone called GARTH STONE is procured: and 1860 good slate for roofing purposes, and for slabs in pavements, cisterns, etc.; several containing 60 to 70 ft. super.; and 18 ft. by 6 ft. in size. The slabs are of a uniformly pure unspotted dark slate grey colour, and their qualities were noted by W. G. SMITH at the Architectural Institute of Scotland, as reported in *BUILDER JOURNAL*, 1853, xi, 93.

Four miles from the town, the Ellesmere canal is carried across the river Dee; and in the neighbourhood is the grand aqueduct of Pont-y-Cysylltan, by T. Telford, consisting of 19 arches, 126 ft. in height. The great railway viaduct, nearly one-third of a mile in length, across the river Dee, is described in the *CIVIL ENGINEER*, etc., *Journal*, 1848, xi, 317.

The following experiments made 1848 on the slate at the time the Chester general railway station was constructed, are given in the *ARCHITECT*, etc., *Journal*, ii, 329. The slate was splintered with the breaking weight, which was placed on the middle of its length.

| Entire length. | Distance between bearings | | Length of slate | | Depth | Weight of | Breaking Weight | Deflection |
|----------------|---------------------------|------|-----------------|------|-------|-----------|-----------------|------------|
| | ft. | ins. | ft. | ins. | in. | lb. | lb. | in. |
| 2 | 3 | 0 | 1 | 0½ | 0 | 96.75 | 19.00 | 1.15 |
| 3 | 3 | 0 | 1 | 0 | 0 | 96.75 | 24.00 | 1.1 |
| 3 | 3 | 0 | 1 | 0½ | 0 | 97.75 | 24.25 | 1.0 |
| 3 | 3 | 0 | 1 | 0½ | 0 | 101.25 | 37.70 | 1.0 |

LLANOS (SANCHO DE), undertook 1579-80 to finish the *cay* and *contrecay* at Gijón, in Spain. 66.

LLANOS (SEBASTIAN DE) may have been a brother of SANCHO. He constructed 1571 the great staircase and the corridors upon the arch which adjoins the prison, and gives a passage to the old *consistorio*, so as to join the prison and the *ayuntamiento* of the town of Gijón, in Spain. 66.

LLANOS (SAN CRISTÓBAL DE LOS) also called Ciudad de las Casas, villa Real, and villa Viciosa. A city, founded 1528 on the site of an Indian town, in the department of Chiapa in Mexican Confederation. It possesses a cathedral; an episcopal palace; an ecclesiastical seminary; a college; three monasteries; a nunnery; and an hospital. 50.

LLANTRISSENT. A town in Glamorganshire, South Wales, only to be mentioned herein as the nearest place to the celebrated Pont y tu Prydd erected 1751-5 by W. EDWARDS, and described under his name.

LOBET (MARTIN) contracted 18 September 1424 to finish the tower called the Micaete of the cathedral in Valencia for 2000 golden florins provided he had the administration of the fabric, the wheel, cables or ropes (*gumenas*), baskets of bass (*capazos*), etc. 66.

LLORET (JUAN) of Valencia, with J. Pavia of S. Felipe, surveyed and approved 6 December 1591 the works by Jaime

and Andrés Terol to the church of S. Salvador at Cocentaina, in Valencia. 66.

LOAD. In building operations the term generally implies as much weight as one horse can conveniently draw, which is about one ton. A "double load" is nearly that which two horses can draw, inasmuch as a cart holding double the quantity of a single load is not always the double of its weight. A. A.

"From a ton to twenty-five hundred weight is, in the neighbourhood of Glasgow, a common load for a one horse cart, independent of the weight of the cart itself. The carrier between Glasgow and Edinburgh considered twenty-four hundred weight as the proper loading for each of his horses"; FORSYTH, *Beauties of Scotland*, 8vo., Edinb., 1808, iii, 70. Three cart loads were considered to measure a cubic yard at Edinburgh in 1806; STARR, *Picture*, 12mo., Edinb., 1806, p. 72. Ton.

The following list gives a cart load of the several items specified, but it will be evident that many refer to an old bushel of 2256 cubic ins. struck, and 2820 when heaped; instead of the present imp. bushel of 2218.192 cubic ins. struck, or the other imp. bushel of 2815.5 nearly, which is always heaped.

- 1 cubic yard of 27 cubic feet, or 21 struck bushels (1848).
- A cubic yard of sand, or of drift.
- No. 20 cubic feet of clay firmly trod (LANGLEY, 1750).
- No. 18 heaped bushels of gravel (LANGLEY, 1750).
- No. 18 bushels of sand (LANGLEY, 1736).
- No. 24 heaped bushels of sand, and of loam (LANGLEY, 1750).
- No. 30 struck ditto.
- No. 36 bushels of sand, in 1700.
- No. 30 (struck) bushels of lime (LANGLEY, *Builders' Assistant*, 1738).
- No. 30 or 32 bushels, in localities (LANGLEY, 1750); in the country about 40 bushels (LANGLEY, 1736).
- No. 21 struck imperial bushels, or No. 17 (called 18) heaped bushels, of lime (See BUSHEL; HUNDRED; and MEASURE).
- No. 27 hods 27 cubic ft. of mortar (1848 and 1852).
- No. 30 hods of mortar (1853).
- 45 cubic ft. = a cart for night soil holding 2½ tons (1852).
- No. 40 imp. bushels = 5 quarters of wheat } round
- No. 72 imp. bushels = 9 ditto of oats } Dorking.
- No. 36 trusses of wheat straw.
- No. 500 statute bricks; 500 pan, and ridge, tiles } (LANGLEY, 1750).
- No. 1000 plain tiles, weighing 1 ton 1 cwt.
- 40 cubic feet of unheven fir timber, called a ton.
- 50 " squared " "
- 600 sup. ft. of inch deals. " 200 sup. ft. of 3 inch deals.
- 400 " 1½ " " 173 " 3½ " "
- 300 " 2 " " 130 " 4 " "
- 240 " 2½ " " "
- No. 30 bundles of 5 ft. laths. No. 37½ of 4 ft. laths (LANGLEY, 1750).

LOAD BALK, see BALK.

LOAD ON A FLOOR, see FLOOR, p. 52. IMPACT; JOIST; ROOF COVERING (weights of); SUPPORT.

The effect of a running load over a bar (a question seldom raised in the works of the architect) was shown by prof. WILLIS's experiments at Cambridge, to be greater than the effects of the same load when at rest and placed on the middle of the bar. The deflection of the bar increased as the velocity of motion increased. The curve assumed by the bar during the transit of the load was deepest near the further end of the bar, showing that the effects of the running load are cumulative. Little deflection occurs at first, but when three-quarters of the length of the bar is travelled over, the wave of force seems to gain its greatest power, and rapidly subsides at the other extremity; such a bending must greatly strain a bar. The experiments showed that fracture generally occurred beyond the centre, and sometimes in three, four, or five, places; WARR, *Dynamics*, 8vo., London, 1851, p. 256-7. WILLIS, *Essay on the effects produced by causing Weights to travel over elastic bars*, in Appendix to Report of the Commissioners appointed to inquire into the application of iron to railway structures, July 26, 1849: extracted in BARLOW, *Strength of Materials*, etc., edited by Heather, 8vo., London, 1851, p. 432.

LOAM. A name given to very mild clay, such as naturally contains a great deal of soft sand. It is unfit for making tiles,

or kiln burnt bricks, but is very useful to mix with stronger clays for clamp bricks. BRICK (MANUFACTURE OF). Loam is now very little used in building, except for the poorest class of cottages, or hovels, in which it is employed as WATTLE AND DAB work, or sometimes as a sort of plastering on laths. If protected from the drip of rain this work will last some time, especially if well mixed and beaten up with cut straw. The milder the loam the less it will shrink in drying. Early loam work is often stamped in patterns. A. A.

The following terms used by BRANDE are given in the CIVIL ENGINEER, etc., *Journal*, 1844, vii, 14: when in a hundred parts of soil there are 10 of clay, it is termed sandy; from 10 to 40, sandy loam; from 40 to 70, loam; 70 to 85, clay loam; 85 to 95, strong clay; 95 to 100, agricultural clay.

Loam in the neighbourhood of London consists of fine reddish grey sand 87 parts, and of alumina 13 parts; WEALE, *Dict.*, 1849-50.

HARRISON, *Descr. of England*, fol., London, 1586, p. 187, writes, "The clae wherewith our houses are impannelled is either white, red, or blue, and of these the first dooth participat verie much with the nature of our chalc, the second is called lome, but the third effsoones changeth colour so soone as it is wrought, notwithstanding that it looke blue when it is throwne out of the pit." "Some plaster, or some lome, or some roughest about him, to signify wall"; SHAKESPEARE, *Midsummer Night's Dream*, act III, sc. I. A partition put up in 1633 is described as of "loam and plastering and wooden quarters." The houses of the ancient Peruvians near Lima were built of "loam bricks", and still exist.

Woolwich loam, and Windsor loam, the latter brought to the brick kiln at Gerrard's-cross by way of Windsor, both endure very great heats before they will vitrify, and are made into mortar for setting furnace bricks; LANGLEY, *London Prices*, 8vo., London, 1750, p. 47.

Loam is a sort of reddish earth, used in buildings (when tempered with mud, jelly, straw, and water) for plastering walls in ordinary houses; BUILDER'S DICTIONARY, 8vo., London, 1734.

Loam is a greater preserver of timber, whereas mortar eats and corrodes it; so that all girders, joists, etc., which lie in walls must be loamed all over to preserve them from the mortar; MOXON, *Mechanick Exercises* (Bricklayer), 4to., London, 1700, p. 26; and (House Carpentry), 1693, p. 141. In the article BEDDING TIMBER, it is stated that this practice of former times is very dangerous. LIME (p. 90).

In brazing small work that will not endure welding, and is so small and thin that the iron will run as soon as the brass, a loam is to be made of three parts clay and one part horse dung, wrapped round the work, placed on the hearth to dry, then placed in the fire until it is of a full heat looking like a well-burnt coal of fire, then take it out and let it cool, break it up and take out the work; MOXON, *Mechanick Exercises* (Smithing), 4to., London, 1700, p. 11.

LOAM-HOOK. A tool used by bricklayer's labourers for beating up loam before using; MOXON, *Mechanick Exercises* (Bricklayer), 4to., London, 1700, p. 14.

LOBAS or LEBAS (JOHAN), commenced 1742 the detached hexagonal belfry tower at the west end of the church of S. Michael (erected by the English) at BORDEAUX. The tower was completed by his son JOHAN in 1492; BERNADAU, *Vie-graphie Bordelais*, 8vo., Bruxelles, 1844, p. 301.

LOBBY (It. *andito*, *corridoio*; Fr. *corridor*, *galerie de passage*; Ger. *laube*). This term is now applied to a small apartment leading into another of more importance (the houses of parliament afford well-known instances); also to an outer hall; and also to the corridors round the boxes at a theatre, concert-room, or other public place. The word is said to be derived from the Ger. *laube*, an arbour, but this seems very unlikely as an arbour does not lead to any other place, which is invariably the case with a lobby. ANTE-CHAMBER. A view of an entrance

lobby' to a warehouse in the city of London, is given in *BUILDING NEWS Journal*, 1857, iii, 285. The term does not appear to have been used in plans of houses much before the present century. A. A.

An idea that this word was adopted because suitors, waiting in a lobby for audience, somewhat resembled pendants in the lobe of the ear, is more elegant than the notion that the Ger. *laube* meant a bower for the goddess Cloacina; but the latter seems to be nearer the truth to those, who see a connection between this term and the English word *lob*, while they remember that not even a porter, usher, or groom of the chambers had originally any place in the lobby, and that an obscene usage of the space between the two *portières*, or between the double doors, of an opening in a thick wall, is said to have lasted in France until the end of the reign of Louis XVI. It is evident that such a space might be confined within the jambs of the opening; or might expand, through openings in those jambs, into passages containing sinks: even at present the water-closet in a mansion is separated by its lobby, an otherwise unoccupied space, from the passage or corridor into which it opens. But when the English court became more decent in the sixteenth century, the lobby became a passage room from one chamber to another; thus WORTON, *Life of the duke of Buckingham*, 4to., London, 1642, p. 24, speaks of "a kinde of loby between that room and the next"; and before 1700 the lobby was the place for those persons at a levee who were favoured by being allowed to attend, a little nearer to him than others, the appearance of the patron. Such "an opening before a room", as the lobby is loosely defined in JOHNSON, *Dict.*, might eventually be so lengthened as to surround the room: its privacy and want of communication with the exterior would render "lobby" a fit term for the places to which the members of legislative chambers retire to vote.

LOBE. A term formerly in use with "feathering", for the small arch, which is obtained between cusps in mediæval tracery, panning, etc., and still often called a *roil*. 16.

LOBETUM, the ancient name of Santa Maria de ALBARACIN, in Spain.

LOBIUM. This term, which may have been a mediæval adaptation of the Gr. *λόβιον* a diminutive of *λόβος*, seems to have intimated a covered standing-place; but no translation of it is offered by DUCANGE, *Gloss.*, 1845 edit., s. v., quoting the following passages. "Postquam, autem descenderint, ducent eos in lobium ante hospitale. Obsessi stabant ad lobium comitis. Canonici S. Stephani dedi lobium unum, quod est in foro juxta lobium ipsorum. In festo S. Marci xxv libras bonorum Proveniensium pro presbiterio crucium, et lectorum, et lobii."

But this term may possibly be the same as the mediæval *laubia* and *laubium*, which are defined by the same author, s. v. *lobia*, *laubia*, *lobium*, as "an open porch intended for walking exercise." He states it to have been originally derived from the Teutonic word *laube*, a leaf, because in such ambulatories trailing plants were trained, the leaves of which formed a shade in hot weather; and he gives the Fr. *galerie*, as an equivalent. Many authorities for his opinion are added, among which occur the following interesting quotations. "Habet mansum dominicatum, casam cum laubia et cellario, et caminata, et quoquinam. Habet mansum dominicatum, casam cum solario, et cellario, et caminata, laubia, horrea 2, etc. In laubia magiore ipsius palatii, etc."

LOBMAR (GERHARD VON) with Johannes of Cologne and Adam of Cologne 1483-87 were consulted on the building of the middle aisle of the Victorskirche at Xanten. 92.

LOBONS (JOHN) see LEBONS (J.)

LOBWASSER (FABIAN) with meister Hans von Schneiberg, built 1516-40, the pfarrkirche at Schneiberg. 92.

LOCAL COLOUR. This term signifies, in the art of painting, the colour (whether natural or artificial), which is peculiar to an object, as irrespective of reflection of light as of modification by shade. The application of the word as regards sculp-

ture of the human figure will be noticed *s.v.* POLYCHROMY. In architecture, the term has precisely the same meaning as in painting: but it is desirable to guard against two errors that may be due to the unfortunate choice of the word "local." It does not follow, because the natural or artificial colours of local materials (where they are employed) are the local colours of those portions which they occupy in a building, that the term 'local colour' means only the colour of local materials. The second error is that, because there may be spots or bits of particular colours introduced in a design, those alone can be held to deserve the name of 'local colours.' Both these faults are combated in the following sentences, and in those which will be found *s.v.* LOCAL MATERIALS (COLOUR OF). A. A.

In the present case it is proposed to treat of local colour when expressly designed by the architect as one of the integral parts of the artistic result. Almost all building materials are of various colours; and it is important for the architect to arrange those substances so as to obtain harmony and not discord. The Arabs and the Italians have largely availed themselves of the different colours of brick, stone, and marble, to produce effects in their buildings: in parts of Northern Italy red brick and white stone have been used in horizontal bands, at Genoa, Pisa, Florence, and elsewhere, bands of dark grey, green, black, or red, have been introduced with different success; and the use of various coloured marbles combined with glass mosaic, has been carried most successfully to its fullest extent in the exterior of S. Mark's at Venice. It may be asserted that all colours are equally good; beauty resulting from a proper contrast and harmony. A so-called monochrome is perhaps the form of using colour that is most in vogue where white or grey stone is used; and the effects are got by the greys of the shadows; or by the use of different shades of grey, in stone, marble, brick, or tile, culminating in black: this is in reality bichrome; equally good effects may be produced by white or black grounds; care being taken in the latter to use the white as sparingly, and as minutely, divided as possible. As to reds, the most inharmonious contrasts are with white or blue, although they are the contrasting colours most frequently used: black, orange, purple, deep or pale greenish greys, harmonise the best; but even the blue greys of slate, zinc, or lead, are more agreeable to the eye than white, which always has a more or less vulgar appearance. When the immense variety in colour of the different sorts of building stones is considered, the application of them to produce pleasing effect of colour must be considered to be still in its infancy. It is surprising that, in a city like London, tiles have not been adopted: they afford not only protection from damp, and the capability of being easily cleaned from soot, but also the means of coloured decoration of the most beautiful and varied description. The different kinds of plaster might also be employed in the same manner for outside work; and even with greater effect for interiors where the dazzling white of Parian cement may be used in conjunction with the soft grey of trowelled stucco, the greenish grey of Portland cement, the brown of Roman cement, or the black, green, or red, of silicate of iron. It is not to be doubted that inlaid marble and coloured tiles will be more generally used: and even already there is a return in cabinet work to the different coloured woods, ivory, tortoiseshell, and ormolu, employed till within the last half century; and the enrichment is carried still further by the insertion of coloured marbles, tiles and precious stones: the Japanese, in some of their lacquered work, introduce painted porcelain tiles with excellent effect; lapis lazuli, onyx, chalcedony, hematite, and even the more precious stones have been largely used by the Italians for their costly cabinets.

The subject is too vast to be more than hinted at in this notice: it is at present an almost untrodden field which offers the greatest scope for the exercise of the skill of designers. G. A.

LOCAL GOVERNMENT ACT. The Public Health Act 1848, was amended by the Local Government Act 1858, 21

and 22 Victoria, cap. 98 (2nd August 1858), for the purpose of making further provisions for the local government of towns and populous districts in England. TAYLOR, *The L. G. Act 1858, and the Acts incorporated therewith, together with the Public Health Act 1858*, notices that "these Acts, taken together, constitute a very complete code for the purposes of town improvement. They may be put in force by an expression of local will, through a resolution of local representative bodies, when such bodies exist, or a resolution of owners and ratepayers, where they do not.—By the adoption of this Act, boroughs, towns, and places, possessing known and defined boundaries, may obtain powers for their own government and improvement, without recourse to the central executive or to parliament; and places not having defined boundaries may acquire them for the purposes of this Act, as hereinafter described." The Local Government Act came into force on the 1st Sept. 1858 in all districts to which the Public Health Act 1848 has been applied. Local boards of health under the latter Act, have now all the powers of local boards under the new Act; and local boards under the new Act will have all the powers conferred upon local boards of health by the Public Health Act 1848, which will be found reprinted in this volume, together with the alterations made in it by the Local Government Act. The Local Government Act has been framed throughout on the voluntary principle. Towns are free to adopt it or not, at the will of their local representative bodies, or their owners and ratepayers. From the date of the passing of this Act, no town in England—no aggregate of houses even, not yet having acquired the name and legal character of a town—can plead the cost of a local act as a reason for remaining without powers for its own government and improvement."

The powers of Local Boards extend to sewerage, scavenging, cleansing, regulation of buildings, highway repairs, streets and roads, water supply, purchase of land, etc., police, lighting, baths and washhouses, burials, markets, etc.

The appendix in the above named work contains—

- 10 and 11 Vict. c. 89 (22 July 1847) Act for consolidating in one Act certain provisions usually contained in Acts for regulating the police of towns.
- 10 and 11 Vict. c. 34 (21 June 1847) ditto in Acts for paving, draining, cleansing, lighting, and improving towns.
- 10 Vict. c. 14 (23 April 1847) ditto in Acts for constructing or regulating markets and fairs.
- 10 and 11 Vict. c. 34, Towns Improvement Clauses Act 1847, as to supply of water.
- 11 and 12 Vict. c. 63 (31 August 1848) Act for promoting the public health.
- 12 and 13 Vict. c. 94, 1849; 15 and 16 Vict. c. 42, 1852, are short conformatory Acts; and 21 and 22 Vict. c. 97, 1858, for vesting in the Privy Council certain powers for the protection of the public health, and called the "Public Health Act" 1858.

21 and 22 Vict. c. 98, to amend the Public Health Act of 1848, called "the Local Government Act 1858." 24 and 25 Vict. c. 61, Local Government Act 1858 Amendment Act 1861. 26 Vict. c. 17, the Local Government Act 1863. GLEN, *Law relating to Public Health and Local Government*, 4th edit., 12mo., London, 1866.

LOCAL MANAGEMENT ACT for the metropolis 18 and 19 Vict. c. 120, received the royal assent 14 Aug. 1855. In the preamble it sets forth that "it is expedient that provision should be made for the better local management of the metropolis in respect of the sewerage and drainage, and the paving, cleansing, lighting, and improvements thereof." It has been well described at the time as "a bold and original attempt to supply a great practical want, and to give to two million and a half of people, closely packed together, that organisation of which, by some inexplicable oversight, they have hitherto been deprived." The strictly local portion of the machinery constituted under the Act, are the District Board of Works, consisting of the Vestries of the most important parishes, and of Boards elected for districts consisting of groups of the other parishes, etc. The central governing body is

entitled "The Metropolitan Board of Works." The attention of the architect and surveyor is chiefly directed to the clauses from 67 to 144, in furtherance of the duties under the Building Act: and to a few clauses in the 1862 Act.

67. Duties and powers of Vestries and District Boards.

Sewers (except main sewers) and drains; water-closets; ditches; public conveniences; paving; vaults and cellars under streets; occupation of underground rooms as dwellings; fences; watering of streets; cleansing; removing projections; hoards; sweeping; lighting; slaughter-houses; medical officers of health; inspectors of nuisances; and to execute the "Nuisances Removal Acts."

135. Duties and powers of the Metropolitan Board of Works.

Main sewers vested, and to make new ones; orders for controlling vestries, etc.; naming of streets and numbering of houses; register to be kept of alterations in names of streets; buildings not to be brought beyond line of street; to make improvements.

Amendment Act 19 and 20 Vict. c. 112, 29 July 1856.

Refers to church rates; rentals, etc. Sec. 144 to extend to authorise applications to Parliament for providing parks, etc.; to take ground for open space or pleasure ground, etc.

Amendment Act 21 and 22 Vict. c. 104, 2 August 1858, "for the purification of the Thames and the main drainage of the metropolis."

Amendment Act 25 and 26 Vict. c. 102, 7 August 1862.

Debts and expenses; to stop up carriage or footways, etc.; to take land; formation and maintenance of bridges; trapping gullies; railways; owners etc. of land may execute works of drainage at their own expense; vestries etc. to submit plans of new sewers to M. B.; and other clauses which relate to drains and sewers; improvements; buildings projecting beyond general line when taken down to be set back; height of buildings in certain streets; width of roadways; penalties; etc.

The three first named Acts are published in WEALE, *Rudimentary Treatise*, No. 108, 12mo., London, 1858-9. J. J. SCOTT, *Act for the Better Management*, etc., 8vo., Lond., 1855. LOWER, *Metrop. Buildings*, and *Metrop. Loc. Manag.*, 8vo., Lond., 1855, includes the Building Act 1855; the Building Act 1844, 7 and 8 Vict. cap. 84, sect. 54-63, relating to dangerous businesses and noxious and offensive businesses; the Building Act 1774, 14 Geo. III, cap. 78, sect. 74-86, relating to fire-engines, chimneys on fire, etc.; the Companies Clauses Consolidation Act, 8 Vict. cap. 16, sect. 4, 5, 128-134; and the Metrop. Local Manag. Act, 18 and 19 Vict. cap. 120, sect. 68-90; 98-144; 198; 200-11; 215-22; 227-34; 237-51, and schedules A, B, C, and D. WOOLRYCH, *Metrop. Local Manag. Acts*, with notes, and appendix of statutes, etc., 8vo., Lond., 1863, contains all the above Acts, and the portions of sixteen others relating to them, p. 345-581. BUILDING LAWS; JURISPRUDENCE.

The borough of Liverpool is under a special "Act for the promotion of the health of the inhabitants of the borough of Liverpool, and the better regulation of buildings in the said borough"; which was passed 5 Vict. c. 44, 1842. It contains the followings regulations relating to buildings; § 4, width of streets; 5, erection of houses in close courts; 6, level of ground floors; 7, size and height of rooms; 9, size of windows; 10 and 11, as to occupation of underground rooms; 13 to 17, regulating privies, cesspools, and drains; and § 29 to 84, constitute a building Act for the borough very similar in its provisions to that of the metropolis. Another Act, 6 and 7 Vict. c. 109, 1843, "an Act for the better protection of property in the borough of Liverpool from fire", relates chiefly to the construction and arrangement of warehouses with reference to the objects of the Act.

c. r.

LOCAL MATERIAL. Any material fitted for construction, which may be found in the neighbourhood of a building about to be erected, the use of which will be economical, inasmuch as the cost of transport will be comparatively light. Thus, as regards that simplest of constructions the hut, in countries like America, which abound in light fir, small trees are cut down and used. LOG HOUSE. Where there is no stone, and brick is

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dear, and timber not very abundant, stakes driven in the ground with brush wood interwoven and then daubed over with loam make a very good shift for a hut or cottage. LOAM; WATTLE AND DAB. In those open parts of Wales and Scotland where timber is very scarce and stone plentiful, flags are gathered off the ground and piled up dry to form walling. In chalk countries, where lime can be had cheaply, and flint may be got for digging, rubble work, plain, laced, or plastered, is generally used. The same remarks will apply to all classes of building, even to cities themselves. Aberdeen and Edinburgh are built almost entirely of granite; a stone which is expensive to work but is so abundant that the cheapness of the material counterbalances the cost of labour. Paris and the towns on the Seine, Bath and the chief of the Somersetshire towns, are built of the local oolite; while London and the environs, which are in the midst of the alluvial plains, are built of brick, or of brick with stone dressings. In the north of Italy, the plains are also alluvial, but the mountains are either of marble or granite, so the best buildings are generally a combination of marble with brick, and not brick and stone. No especial rules can be laid down beyond the above statements of facts. The practical working must be left to the taste, skill, and judgment of the architect. ANDERSON, *Local Peculiarities of Church Architecture*, in the ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., Lincoln, 1851, i, 307-14.

A. A.

LOCAL MATERIALS (COLOUR OF). It has already been explained briefly under LOCAL COLOUR, that the local colour of a local material is either its natural or an artificial one. The latter may be produced by polish, by glaze, by colour and glaze, by a dye with or without varnish, or else by paint with or without varnish. It is important for the architect to bear in mind the appearance which the effect of his building will undergo from natural subsequent alteration such as the growth of lichens, the stripes of dirty drips, etc.; on a principal front the clean spot of brickwork exposed to a colourless splash has been made a ground of complaint. Even when economy is not a primary consideration, the architect will find that he may sometimes have reason to prefer one material that is not very changeable in its local colour, to another which may be within his reach; and, although far more expensive, may alter considerably by exposure to weather.

In some parts of the world the stone, or marble, which is originally white, or yellowish, turns bright orange by the action of the atmosphere; in other places it becomes heavy grey, or yellowish, by the growth of lichen; which also turns red brick or tiles to a green: in London, stone very frequently becomes almost black, or brilliant white, according to its capability of resisting the weather. It is very essential to bear in mind that many of the marbles and granites lose their polish and rapidly decay, so that after a few years the intended colours disappear, and the expense of using costly materials is more than thrown away, the marble so rapidly perishing as to cause dilapidation: this is particularly noticeable in white, veined, and black, marbles; and is more or less applicable to all, porphyry and some of the harder granites alone resisting atmospheric effect.

G. A.

The question of the propriety of using local materials merely for the sake of their local colour is still open to much discussion: it principally affects external walls and their dressings; and it must be remembered that now Bath, Caen, Portland, and York, stones are, or might easily be, in almost every builder's yard in this country. Still, where economy is a consideration, as it almost always is, the cost of transport of materials will force upon the architect the use of some of those near at hand. In this case much may be done by a mixture of colours. The strong colour of red brick may be toned down by a mixture of black headers and sometimes of flint. The same observation will apply to tiles. Flint must have dressings, for of course jambs and tracery cannot be executed out of that material. Kentish ragstone is excessively hard to work, and

is generally found in small pieces, so there is a reason for the employment of freestone dressings with it. Like all other matters of taste the most opposite opinions prevail on this subject.

To some persons the most pleasing natural local colour is the granite of which the greater part of Aberdeen and Edinburgh is built. A light coloured stone like that of Paris or Bath is considered by many as next to this, while others prefer the same when covered by grey lichen. Some prefer bricks of the brightest red that can be procured; while others, like the late Mr. Repton, say "a red brick house puts a landscape into a fever." Others introduce malm brick facings, and seek as bright a yellow colour as possible. Some will have nothing but pure white, and if stone of that description cannot be procured, will whitewash or compo down the fronts, and colour or paint the surfaces, so as to dazzle the eyes for some time after execution. In fact, after all controversy, very much must be left to the taste of the architect, the circumstances by which he is surrounded, and (above all) his sense of propriety. A. A.

LOCCADELLI (VINCENTO), about 1584 was employed as a civil and military architect by Henry IV of France, and by Emanuel duke of Savoy. GRASSELLI, *Abecedario*, 12mo., Milan, 1827, p. 148.

LOCH or LOOCH. A term used in the accounts for building the spire of Louth church, Lincolnshire, cir. 1501, as a place in which to lay stone; BRITTON, *Antiquities*, 4to., London, 1814, iv; and *ARCHÆOLOGIA*, 1792, x, 72.

LOCK (Lat. *sera*, *claustra*; It. *serratura*, *serrame*, *toppa*; Sp. *cerraja*; Fr. *serrure*; Ger. *schloss*; each variety of lock, e.g. Fr. *serrure à bosse*, is explained in VIRLOYS, *Dict.* 1770). A fastening in which a movable piece called the *bolt* is projected by the action of a *key*, and cannot be returned to its original position except by another application of the key. Locks are frequently alluded to by ancient classical writers (HOMER, *Odyssey*, xxi); and also in the Scriptures, as at the rebuilding of Jerusalem by Nehemiah (ISAIAH, iii, ver. 6). There is reason to conclude that these locks were of simple design and for the most part made of wood. The most ancient lock of which there is any specimen is Egyptian, and its principle still prevails in that country as well as in Turkey, in as primitive a form as when carved among the sculptures at Karnak about 3 or 4000 years since. When the bolt of this lock is pushed home, three pins fall into a similar number of cavities in it and hold it fast; the key raises them again, so that the security is very small (WILKINSON, *Manners*, etc., of the *Ancient Egyptians*, 8vo., Lond. 1837, p. 111). Locks of this description have for many centuries been in use also in some parts of Cornwall and the Farøe Islands, and were probably introduced there by the Phœnician merchants. The keys found at Pompeii and Herculaneum prove that a warded lock was known to the Romans. During the Middle ages, locks of great complexity were made in various parts of the continent having *fixed wards* as their security. The *lever* or *tumbler* lock was first made in China, of wood, and used there for centuries: it was not known in England until about the end of the eighteenth century, when the principal feature of its construction was patented by Bramah. Another sort of lock, well known in England in the fifteenth and sixteenth centuries, is the *letter* lock, commonly made in the form of a *pad* lock; this was so constructed that certain letters engraved upon the rings may be required to spell a word or number of words, before the lock can be opened. The security is very small, and the invention is now regarded as more curious than useful: about 1670, RENIER of Paris claimed the credit of being its original inventor. An escutcheon of this character was invented by Marshall and rewarded by the Society of Arts in 1784, *Transactions*, iii; others are noticed in xliii and l.

These four varieties of locks, viz., Egyptian, warded, lever, and letter, contain the main principles of all the modern inventions. The difference between the old tumbler and the lever (the terms are now often applied indiscriminately) ap-

pears to be that the tumbler has a pin which falls into a notch in the bolt, while the lever has slots (as in Hobbs' locks) which receive a pin secured to the bolt.

In the twelfth century, the productions of English artizans in lock-making had reached a degree of comparative perfection. From the fourteenth to the end of the sixteenth century, locks were usually very elaborate and complicated pieces of mechanism, and often formed very conspicuous ornaments, with their elaborate metal plates in flat and raised work (*Illustrations*, s. v. Metal work); a lock being considered the master piece in smithery. An example of a lock of the fourteenth century still remains on the door of Snodland church in Kent; another of about the same age at Winchester cathedral. In 1365-6, eighteen 'stoklocks' for the doors of the king's treasury at Westminster, cost 15*d.* each; six great 'plate locks' with keys for the *armariol* in the chapel, 5*s.* 10*d.*; and six 'clykette locks' with keys, for divers doors, cost 5*s.* 2*d.*; BRAYLEY and BRITTON, *Westminster*, 8vo., Lond., 1836, p. 192-3. "In ij stocklokkes pro ij ostis prædictæ turris empt x*s.*; et in ij hangelokkes (padlocks) pro prædictâ turre xv*j.* *d.*;" occur in the *Accounts of the Manor of the Savoy*, temp. 16 Rich. I, given in *ARCHÆOLOGIA*, 1832, xxiv, 302: "ij hanklokkes emptis de Willielmus Mirefelde 10*d.*; et in ij stocklokkes (viii *d.*) et ij hanklokkes vi*d.*;" occur in the *Durham Booke*, A.D. 1531. In 1532 mention is made of large locks (? bars) *seræ amplæ*, loks, stoklokkes, and hanklokkes or hangloks, in SUITES SOCIETY, *Finchale Priory*, 8vo., Newcastle, 1837, p. 447.

During the reign of queen Elizabeth, one Mark Scaliot a blacksmith, is reported to have made a lock which with a pipe key weighed only two grains of gold. In the reign of king Charles II was invented the first *detector* lock, which is described by Henry SOMERSET, marquis of Worcester, *Century of Inventions*, 12mo., London, 1663.

The first patent for a lock was granted in 1774, since which time "not less than one hundred and twenty inventions and improvements" in locks and latches have obtained the protection of the patent laws (a list is given in TOMLINSON, p. 164); only a very small proportion of them has escaped obscurity. Almost the first improvement was patented by Robert Barron of London, for a lock in which the security was effected by fixed wards with lifting tumblers or levers. This invention was at once received with favour, which it still retains. In 1784 Joseph Bramah of London patented the well known *Bramah* lock. In it a sliding bar or bolt had a number of notches cut in its edge; into these notches are placed an equal number of small bars, so as to prevent the motion of the bolt until their removal is effected. Thus a compound of endway, pushing, and revolving, motion is given to the key, instead of the simple rotary movement of Barron's lock. The principle of its action is precisely the same as that of the old *tumbler* lock. In 1851 this lock was picked after sixteen days' perseverance, but the discovery of new means of baffling the lock-picker's art by the introduction of false notches, has restored to it its former repute. In 1818 was patented the *Chubb* lock, by Jeremiah Chubb, since modified and improved by the successive patents 1824 of Charles Chubb; 1833 of Charles Chubb and Ebenezer Hunter; 1846 of John Chubb; and 1847 of J. Chubb and E. Hunter. This last lock consists of six separate and distinct double-acting tumblers with the addition of a "detector", which is the great and peculiar feature by which Chubb's lock is known. His "combination latch" combines the simple lifting action of the ordinary French latch, or that which opens with a handle inside the door and with a key outside, with much of the security of a tumbler lock. In it a number of distinct latches are mounted and made to shut into or behind a double catch in such a manner that they can only be disengaged from it by being all raised at once to one exact height.

The *Transactions* of the Society of Arts contain many accounts of new inventions (referred to in the PENNY CYCLOPEDIA, Suppl., and in TOMLINSON); such as that of S. Mordan,

whose locks on the Bramah principle were celebrated, with its 'lock protector' in 1830, which is a sort of shield to be placed temporarily over the keyhole of a door to prevent access during the owner's absence, and having in its centre a minute lock with sliders or guards; by turning the key two lancet-shaped tongues are projected so as to dig into the wood on the opposite sides of the keyhole, to hold the scutcheon firmly in its place until the small key has been used, and then the large key admitted to its keyhole. The other inventions are fully described in the *Transactions* above named.

Among the most important inventions now in daily use, are Summerford's double acting draw tumbler lock, *i. e.* a tumbler, which is drawn down by the key instead of being lifted up: Sanders's double acting, sliding, and lifting tumbler lock: Aubin's revolving curtain, closing the keyhole during the revolution of the key: Carpenter and Young's (of Willenhall) *lift-up bolt* or lock, substituting a perpendicular for a horizontal motion to the latch bolt of rim and mortice locks: Davis's locks, which are invariably used in the Cabinet despatch boxes: Baillie's lock, with secret and secure fixings: and Cornthwaites', Duce's, Parson's, Price's, Wolverston's, Carter's, Restell's, and Walters's locks; with Pugh's rounded case rim lock and latch. Gerish's *patent cylindrical mortice* lock invented 1842 differs entirely from the above in form; it is simple in construction, and can be fixed with great facility by boring a hole with an auger in the door, thereby saving the time of cutting the usual large mortice. It has only one bolt for locking; with a contrivance at the back end of the bolt, by which on turning the key, a lever or tumbler is let down to prevent the latch bolt being turned back. A mortice lock of this description, strong enough for a room door, is only 6 ins. long and $\frac{1}{4}$ of an inch in diameter: one is shown in the *CIVIL ENGINEER*, *etc.*, *Journal*, 1842, v. 204. The Denison lock (1851, not patented by its inventor) combines considerable novelty in construction with security; TOMLINSON, p. 142-7, describes it in detail. Hamilton's patent lock is a new invention used by the Mint authorities. Dyans' patent lock has also been much praised. Barrow of London supplied the locks for the book presses in the royal library at the British Museum; one movement of the key shoots a top and bottom bolt in the hollow metal tube of the doors, and also shoots the bolt of the lock in the middle.

The *needle door latch* or lock introduced about 1866 by Mr. Macdonald, has neither tumblers nor levers as in ordinary locks, but consists of steel wires or needles hung on two pivots, which on being acted upon by the key are raised to pass through holes in a plate of brass or gun-metal, and thus the lock opens: they are also made with protectors and detectors. The long familiar and useful *pad* lock is a sort of detached lock in which a curved bar, pivoted to the lock case at one end, is passed through a staple, and then secured by shooting the bolt into a cavity at its free end, which is inserted into the lock, so that it cannot be removed from the staple through which it has been passed. These are made of brass and iron of a common sort as well as by the leading patentees.

Alarm bells are attached to some locks, and others have been so contrived that any attempt at violation would result in the discharge of an appended firearm; but as a rule, these ingenious contrivances are more curious than useful. In 1831 William Rutherford jun. of Jedburgh in Scotland, a bank agent, patented a lock which cannot be opened until after a certain time has elapsed. Against the end of the bolt a circular stop plate is introduced, to prevent the withdrawal of the bolt until the circular plate which is put in rotation by clockwork shall have revolved so as to bring a notch opposite the end of the bolt. As this notch can be set at pleasure at any required distance from the end of the bolt, the lock may be secured against being opened by its own or any other key, till any assigned time has passed after it has been locked. As this account of locks is not so much a history as a description of the usual sorts of such

fastenings, further details must be sought in the works named at the foot of this article.

The *multiple bolt lock* was long since employed for coffers, chests, strong boxes, and safes. If a lock can be picked, the operation is as effective whether the lock has one bolt or twelve. Mr. Duce of Wolverhampton in 1823 constructed, instead of a four bolt lock, four distinct one bolt locks fixed in the same frame and opened by the same key, the bolts to be moved in succession instead of simultaneously. It would therefore require four times as long for one man to pick this contrivance, as a four bolt lock of similar action. It must be remembered now, however, that burglars will not stop to pick a good lock, but rather seek to cut it out, or to force the chest.

The American *Parautoptic* lock for doors of receptacles containing property of great value, made by Day and Newell, is described by TOMLINSON; the English patent is dated 15 April 1851; Mr. Hobbs then introduced his *protector* lock, a modification of the ordinary six tumbler lock; and in 1852 another invention having for its object the absolute closing of the keyhole during the process of locking. His *machine made lever* locks are manufactured to suit every ordinary purpose in hotels, and private houses, and will stand excessive wear.

The characteristic feature of Continental locks is their good design and elaborate decoration, but they are wanting in the strength and practical usefulness of English locks. VIOLLET LE DUC, *Dict.*, gives *s. r.* Serrurerie, p. 318-32, an account of locks and their decoration, from the twelfth century, with existing examples, the earlier ones of which show that the keyhole was downwards; Fig. 32 therein is a bolt (*Fr. verticelle*) the hasp of which, when the bolt is run into the staples, is let down into a lock and therein secured.

The old *spring* lock comprised a main plate, a cover plate, and a pin-hole. To the main plate belong the keyhole, top hook, cross wards, bolt-toe or bolt-nab, drawback spring, tumbler, pin of the tumbler, and the staples. To the cover plate belong the pin, main ward, cross ward, and step ward or dap ward. To the pin-hole belong the hook ward, main cross ward, shank, pot or bread, bow ward, and bit. 13.

The following extracts are taken from HEBERT, *Encyc.*, with additions.

"Large quantities of locks are made *plain*, that is, without any ward or other security except the bolt. The technical term in the trade for a *ward* is *wheel*; thus locks are called according to quality, 1 *wheel*, 2 *wheels*, 3 *wheels*, 4 *wheels*. The wards are short pieces of thin plate iron, rivetted on the upper or the lower plate, near the keyhole, and round which the slits in the key work. If the wards are of a better quality, they are called 1 *ward round*, 2 *wards round*, *etc.*, which is when the wards extend the round, or nearly so, of the lock. They are also called *L ward*, or *T ward*, or *Z ward*, according to the section. *Copper wards* are used in locks required for damp places, as cellars, to outside railings, *etc.* *Solid wards* of brass are much used, especially in fancy locks. The term *fine* lock is used to one that looks smart, being glazed, *etc.*, but it is coarse enough underneath. The quality of the plates, bridges, staples, springs, bolts, and other parts of the interior of a lock, is made to assimilate with the quality of the wards, unless ordered to the contrary.

"Locks, according to their uses, may be divided into two classes, namely 'in-door' locks and 'out-door' locks; of each class there are numerous sorts. Of the former, are the *draw back* locks for entrance doors, wherein the bolt when not locked is made to spring to, and has a knob for drawing it back. As they are generally of iron, they are further designated as *iron rim*, from 6 to 9 ins. in size, to distinguish them from those called *spring stock* locks which have *wooden stocks* or cases; these are cheaper and more frequently put to back doors, and vary from 7 to 10 ins. A superior quality to the former have brass cases. For the doors of rooms there are three principal sort, called *mortice*, *brass case*, and *iron rim*, lock." Both

the latter sort may still be seen in houses of the early part of the last century, and still doing good service; they varied from 6 to 8 ins.; "these have both been superseded, except in houses of the poorest class, for the *mortice*, which is let into the wood of the door (LOCK RAIL). If there be only one bolt to it which the key shoots, it is called a *dead* or *closet* lock", they vary from 4 to 7 ins.; cupboard locks are 3, 3½, and 4 ins. in size; "the addition of a spring bolt with a handle to open it, gives it the designation of a *two bolt* lock; and if there be a private bolt besides, it is called a *three bolt* lock." In *latches* or *latch* locks, the bolt is projected by a spring, and it may be drawn back on the inside of the door by a handle, but on the outside only by a key. When ordering locks, or latches, or strong room doors, it is necessary to state whether they are to



be right or left handed: in the accompanying figure, A is a right hand opening into the apartment by reason of the lock being on that side of the door; B is left handed, as the lock is on that side to one standing out of the room: strong-room doors are made as D opening outwards and shutting towards the left hand, and are called left handed; when made as C or A they are charged for extra: the iron grates, being fixed inside, are supplied as B: (Hobbs, Hart and Co., trade list). A *double handed* lock, either rim or mortice, adapted by a very simple arrangement for both right and left hand doors, was introduced 1865 by Carpenter and Co. of Willemhall. It is also necessary to specify the kind of handle required, as *knobs* or *rings*; the thickness of the door; and if plain wards, round wards, tumblers, patent, etc. The description in a specification for an ordinary lock, is, a best 7 in. 3 bolt mortice spring tumbler lock with solid round wards and fine cut key.

"Under the general term of *cabinet* locks are comprehended a great variety, such as *cupboard*, *book case*, *desk*, *portable desk*, *table*, *drawer* or *till*, *box*, *chest*, *caddy*, etc. They also partake of three forms, as respects the manner of fixing them; they are called *straight* when the plate of the lock is to be screwed with its flat side against the wood; *cut*, when the wood is to be cut away to let in the lock flush with the surface; and *mortise*, when a mortise cavity is to be made edgewise in the wood for its reception." The sizes of these locks vary from 1 to 5 ins.

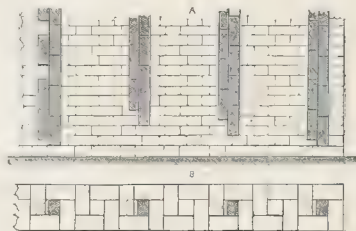
"For *outside* purposes, as gates, stables, sheds, etc., *wood* stock locks are generally used. Of these there are many qualities; as the common or *Banbury*, the *bastard*, the *fine*, and others: the internal parts are made of copper, iron, and brass. There are also the *D* and the *P* gate locks; and the very numerous family of *pad* locks."

JOUSSE, *De la fidelle ouverture de l'Art de Serrurerie*, etc., fol., Paris, 1627. RÉAUMUR, in chap. 5 of *Art du Serrurier* by DUHAMEL DU MONCEAU, by the Académie des Sciences, fol., Paris, 1767; also the article *Serrurerie* in the *ENCYCLOPÉDIE MÉTHODIQUE*. PRECHTL, *Technological Encyc.*, by KARMARSCH, 1842, noticing Bramah's lock with great minuteness. AINGER, paper read before the Royal Institution 1827 (abstract printed in the *QUARTERLY JOURNAL OF LITERATURE* etc.), and further in the article in the seventh edition of the *ENCYCLOPÆDIA BRITANNICA*. HEBERT, *Engineers*, etc., *Encyclopædia*, 8vo., Lond., 1836. PENNY CYCLOPÆDIA, Suppl., 1846. TOMLINSON, Rud. *Treat. on Construction of Locks*, 12mo., London, 1853; 2nd edit. with additions, 1868: and by him in the *Cyclopædia of Useful Arts*, 1850. *Concerning Locks and Keys*, in the *ENGINEER JOURNAL*, 1865, reprinted in *ILLUSTRATED BUILDER'S JOURNAL*, 1865, pp. 408, 426, 446. BRAMAH, *Bramah Locks*, 8vo., London, 1854. CHUBB, *On Locks and Keys*, in *Proceedings of the Institution of Civil Engineers*, 1850. AUBON, *History of Locks*, 1851.

LOCK BAND. A course of bond stones; *Charges of Dover haven*, temp. Eliz.; *ARCHÆOLOGIA*, 1808, xi, 233. 17.

LOCK BOND. A mode of building a brick and a half

wall or a wall of greater thickness, patented 15 January 1812 by J. A. Kelly and R. Vazie, and the buildings erected on it denominated "Moore's modern Architecture." It consists in uniting the brickwork into one solid mass, by placing bricks vertically in the inside of the wall, either in a direct or varied course, from the foundation to the top of the building. This peculiar mode of forming brickwork was considered to greatly reduce the risk of fire, no timber bond being required; and to yield great strength and security in thick walls. Three processes are shown in the figures given in the *REPERTORY OF ARTS*, 8vo., London, 1812, xxi, 325. The vertical brickwork formed of double calcined bricks, is placed at about every six feet distance on the first course. In forming the second course, a vertical brick is placed at two feet from the first one; and in the third course, a vertical brick at two feet from the last; and these are continued up the wall in single or double lines. The system would appear to be serviceable in building a HOLLOW WALL.



A represents a vertical section of the wall, the vertical bricks being shown by the dark tint. The upper part on the left shows another arrangement. B is a plan of the wall.

LOCKER (Fr. *boulin de colombier*). This term was employed in its original meaning for any place in which articles of value could be locked up (AUMBRY: CUPBOARD). At present the word is generally used in a restricted sense for that series of boxes where the fronts are made to fall down on being unlocked and exhibit the contents; such as are used at boarding schools; in offices, and similar places.

A. A. 17.

LOCK FURNITURE. The fittings as applied to a door, by which a lock is worked; a set for a mortice lock usually comprises two knobs, a bolt knob, and two escutcheons, with a key. The following patents are those which now command a large sale, in addition to the ordinary fittings sold with the locks. Gibbon's patent spindles and knobs are fixed without a tap screw through the neck of the knob: Pitt's patent self-adjusting lock furniture and spindle; and his new patent mount and spindle, the plate of the knob being screwed to the door: Ager's patent adjusting spindle: Pugh's patent furniture: Hobbs, Hart and Co's patent frictionless lock furniture, the knobs and spindles being effectually secured from lateral play, and from any tendency to bind in the woodwork of the door, in consequence of the spindle having only one bearing, viz., that by which it is firmly attached to the follower of the lock itself, instead of *three* imperfect bearings, as those hitherto manufactured. The attachment is made in the lock by means of a long screwdriver worked through the 'fore end.' Illustrations are given in the advertising papers. All these fittings are made in brass, bronzed, ebony, oak, maple, and other woods; in horn, glass, china, etc., and the knobs are made round, octagon, and in other forms, and more or less molded and decorated. It is considered, however, impossible to get a thoroughly good spindle and knob. Some are fixed with screws so small that they are always coming off. The old tapped screw if done properly lasts longer than any of the new patents; but in common locks the spindle is ready tapped with holes for various thicknesses and very often the screw does not find the hole; or if it hits, it does not fit properly.

LOCKHEADS' PERFORATED GLASS. This invention consists of a pane of glass opened by means of one or more rows of

incisions according to its width, forming perforations through which, when it is placed in a vertical opening in a wall, a door, or a sash, air can pass so as to make a draught. The glass is sometimes fixed in the reveals of a window, and the sash being raised or lowered affords the requisite quantity of fresh air to pass, and the total exclusion of it when necessary. The patent was taken out by J. Lockhead of Milton, Gravesend, in 1848; CIVIL ENGINEER, etc., *Journal*, xi, 307.

LOCK HOSPITAL. A special hospital for the treatment of persons suffering under venereal disease. It has been suggested that the name is derived from the Saxon *loc* or *loke*, shut close or confined; or is an abbreviation of "lock-up", rather than a derivation from the Fr. *loque*, a lock or bundle of hair or rag applied to sores. A "lock hospital" formerly signified a lazaret-house; and two of the three venereal hospitals for London, existing 1760, had been leper houses. One of them was at the south-east corner of Kent-street, Southwark; and had been lately rebuilt but possessed a chapel erected about 1640: the other, then specially known as "The Lock", is the subject of the following extracts.

In 1437 John Pope, citizen and barber of London, by his Will gave to the masters and governors of the house of lepers, called "le lokes", at Kingsland without London, an annual rent of 6s. 8d. issuing out of certain shops in Sherborne-lane towards the sustentation of the said house for ever; STAYVE, *Survey*, fol., Lond., app., 1720, p. 131. It appears by the records in S. Bartholomew's hospital in London, that soon after the establishment of that charity in the reign of Henry VIII, certain lock or lazaret hospitals were opened at a distance from the city for the reception of persons afflicted with syphilis; about 1737 they were broken up. Each house was under the care of a surgeon, a chaplain, and a sister, a nurse, and a helper, and having twenty beds. "La Loque" or the Lock hospital at Kingsland was one of these, in the old house of lepers. To the old building, the governors annexed a more commodious brick edifice, now divided into four or five distinct tenements. Kingsland chapel adjoins, and is connected with the hospital; it appears from its architecture to have been erected before the Reformation, having been attached to the original lazaret-house; a view of it is given in ROBINSON, *Huckney*, 8vo., London, 1842, i, 127.

Another hospital, instituted 1746 in Grosvenor-place, Hyde-park, was removed to the present edifice at Westbourn-green, Harrow-road, erected 1842-3 for 60 beds by L. Vulliamy, enlarged 1848-9 for 40 additional patients: a particular feature is the chapel, which is allowed to be a source of profit to the building. A chapel is also attached to the Westmoreland Lock hospital for 300 (really 260) beds in Townshend-street, Dublin, opened 1792. The fever and lock hospital at Limerick, established 1781, is generally said to have been the first institution of the sort erected in the United Kingdom. A lock hospital was built at Liverpool circa 1830 by J. A. Picton; the wards are about 50 ft. by 20 ft., and 13 ft. 6 ins. high: the method of ventilation and warming is described in LONDON, *Arch. Magazine*, 8vo., London, 1835, i, 231.

LOCKITTE. A term used in the following instances, apparently appertaining to the securing of a window. "Item we present one window pulled downe,—wherein was five up-right bars of iron and viij overthwart bars or lockittes which to repaire will amount to xls." "Item the bars of iron and lockettes of iron are taken away furth of the windowes"; *Survey of the decays of the — manor house at Howden*, 1577, printed in the ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., Lincoln, 1866, viii, 301-2. The term may probably be derived from the Fr. *loquet* or *loqueteau*, a latch or small latch.

LOCK RAIL. The rail of a door, usually the widest, which receives the lock or fastening.

LOCKSMITH (It. *magnano*, *toppallacchiave*; Sp. *cerrajero*; Fr. *serrurier*; Ger. *schlosser*). The mechanic who worked in metal generally made locks and other fastenings for houses;

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but now the attention of one person is usually confined to lock making. The chief seat of the lock trade in England is South Staffordshire, at the following towns and adjoining hamlets, which have more or less been engaged in the manufacture for upwards of two centuries. Wolverhampton makes *lever*, *cabinet*, and *fine plate*, or common *stock* locks, mostly on the principles of Barron, Bramah, and Chubb; while in the other towns the manufacture is chiefly confined to warded locks, including *pad*, *dead*, *rim*, *mortice*, *drawback*, and other well known varieties of locks in general use. Willenhall manufactures similar locks in kind, but of inferior quality to the above, with the exception of *fine plate*, which are not made: *rim* locks, in brass or iron, chiefly on the principle of Carpenter and Young's patent for export trade, and with the original horizontal motion for home trade: *dead* locks: *drawback* locks: *mortice* locks on either the *dead*, *rim*, or *drawback*, principle; these are the highest priced of the common sort of locks: *pad* locks of brass and iron: *cabinet* locks are made in the outlying hamlets, but are of inferior quality to the Wolverhampton make. At Walsall are made the cheaper sorts of *pad*, and *cabinet*, locks. Wednesfield chiefly manufactures the *cabinet* locks. The lock trade is, however, rapidly extending, and has been introduced with success into London, Lancashire, and other districts. GARRET LOCK is a term applied to the articles of the most inferior description.

The principal foreign rivals with which English locksmiths have to contend, are those of America, France, and Germany. The advantages possessed by the former country is chiefly the fineness of the sand used in casting, which enables the lock or key to be cast with such accuracy as not even to require the finishing touch of a file. An artizan there is said to be enabled to make 150 locks per day to about one dozen in England; but the result is unending and insecure.

LOCURIS, in Italy, see GERACE.

LOCULUS. The Latin name for a coffin, also called *arca*, used in the burial of a corpse. It was frequently made of stone, that sort from Assos in Troas being preferred, as it consumed the body with the exception of the teeth in forty days (PLINY, *H. N.*, ii, 98, xxxvi, 27), whence it was called "sarcophagus", a name which in course of time became applied to any sort of stone coffin or tomb.

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LOCUS. A Latin term frequently used by ancient writers to signify a house occupied by one of the religious orders. 'Locus excelsus' as used in the Will of king Henry V, appears to have signified a loft; RYMER, *Fodera*, ix, 289.

19.

LOCUS AUSCULTANTIIUM. A term found upon the plans of basilicas published by some old authors, especially by SPANHEIM, *Historia Ecclesiastica*, secul. iv, Leyden, 1750, p. 861 (or 12mo., Leyden, 1689), as indicating the place assigned in those buildings to the penitents called *audientes*, or *auscultantes*. The words *locus audientium* are written on the plan given in BINGHAM, *Antiquities*, 8vo., Oxford, 1855, b. viii, chap. 3, in the interior narthex.

LOCUS COLUMBÆ. In early times, (later than Justinian), the Holy Ghost was often represented in the form of a silver dove, hovering over the altar, and the place where it hung was called the peristerium or locus columbæ; LANDON, *Eccles. Dict.*, 8vo., London, 1849, i, 281.

LOCUST WOOD, see *HYMENÆA* and *ROBINIA*.

LOCUTORIUM (It. *locutorio*, *parlatorio*; Fr. *parloir*). The inner apartment in a monastery to which the monks anciently repaired for relaxation after meals and for spiritual discourse among themselves. The *locutorium forinsecum* is the outer apartment in which conversation, under regulations, with members of the external world was permitted. The term has also been applied to a confessional.

13.

Locutorium vero fit ex crebris et spissis laminis ferreis, et forti opere fabricatis. Locutoria autem ad confessiones fiant in Ecclesia, vel alio loco competent; Bull 1263, as cited in DUCANGE, *Gloss.*, s. v.

LODEVE (ancient Luteva). A town in the département of Hérault, in France, and situated on the river Ergue, which is crossed by a handsome bridge. It is walled; poorly and irregularly built; and has an old cathedral dedicated to SS. Genesius and Fulcrandus, possessing a tomb of white marble; there are also two other parish churches; and the usual municipal buildings. 50. 96.

LODGE (Angl.-Sax. *woning*, a dwelling; Angl.-Norm. *loge*, a habitation, a lodging). A term applied in England to a large number of constructions varying in character from the habitation of a beaver to the residence of a prince. Formerly it also meant a workshop, as will be seen in a subsequent passage; but its undoubted connection with the Fr. *logis* shows that the original signification was a dwelling: while the Eng. "lodger" marks that the word once, as still in the case of a stag, expressed a bed-place and a temporary home: the Fr. *loge* for a box at a theatre tempts the observation that the parallelism with box-bed, porter's-box, and shooting-box, is remarkable. A porter's lodge is frequently, as in club-houses, a mere closet or space partitioned off from the hall: it is often, as in factories, a small room near the entrance, termed a gate-lodge: this is the Fr. *loge de concierge* which, in buildings that abut on the street, is in the house; but in the old *hôtels*, where the *corps-de-logis* or mansion was built *entre cour et jardin*, this lodge is in one of the wings of the offices next the street. A gatekeeper's lodge, also called a gate lodge, consists of two or more rooms which, where an entrance to a property is too far from the house for the domestics to answer the bell, either find a place in the gateway building, or are put as a detached cottage near the gate; examples of both sorts are to be found in the parks of London. Next in rank, if not in expense, above that class is the keeper's lodge, properly the gamekeeper's lodge, on a large estate. On princely domains, where forest rights are assumed to be preserved, the lodge of the keeper or ranger formed a good house which served, and even still serves, sometimes as the residence of a relation (frequently a son) of the proprietor, and has become a large dwelling; as the White Lodge or Ranger's House at Windsor. Even moderate dwellings of an owner in a forest or park were called lodges. The Royal Lodge in Windsor park built for king George IV was nearly entirely destroyed 1832-3. From a dwelling, surrounded by private gardens, of a relation or an officer residing on a domain, as Cumberland Lodge at Windsor, the term was extended to such smaller properties as the villa with four acres called Bedford Lodge at Kensington: and these latter when let as country houses caused the word 'lodge' to be included among the names for small suburban houses with scarcely any grounds attached to them.

ZIEGLER, *Royal Lodges in Windsor Park*, fol., Lond., 1839. *Ironwork, Gates, Lodges, etc., of the Royal Parks*, 4to., Lond. (Wenle), 1841. BARBER, *Designs*, 4to., Lond.; DEARN, *Designs for Lodges and Park Entrances*, 4to., Lond., 1811; and in most of the books named, s.v. Cottage, as GANDY, 1805; GOODWIN, 1833; GYFFORD, 1807; HUNT, 1836; PAPWORTH, 1818; and ROBINSON, 1833.

The term "lodge" (i.e. *loggia*) has even been applied to a gallery or colonnaded arcade, as in Moxon, *Vignola*, 8vo., London, 1702, 5th edit., 40-2.

Masons during the mediæval period, when about to erect a building, appear to have had a shed or workshop, called a 'lodge', provided for them, or made it for themselves; this erection appears to have sometimes also served as a residence, or a place in which to eat their meals, as often occurs at the present day. The larger question of the importance and ramification of other lodges or guilds has been discussed s.v. Freemason. The use of the masons' "house of call" or "harbor" as it is styled in Germany, is well described in an *Address* by EVERITT, extracted in the PENNY MAGAZINE, 1832, p. 55. The following list of the use of the term has been noted for reference.

1200. The words "tabulatum domicialem" was applied to the shed erected in front of S. Alban's abbey church whilst it was being rebuilt, and may probably be an early intimation of such a building.
1292. At foundation of S. Stephen's chapel, Westminster; purchase of timber to make a lodge or shed for Master Michel and his masons; BRAYLEY and BRITTON, *Westminster Palace*, p. 424.
1319. For working about that pent house which is for the lodging of the masons in the hostelry, i.e. "in astellaria"; BRAYLEY, p. 122.
1321. An entry occurs of 2s. 6d. for straw to cover the masons' lodging at the erection of Caernarvon castle.
1329. For the wages of "muratores" working on the making of a "muri lutei" round the lodge in which the carpenters and other workmen were at work, with straw for the said wall, 4s. 2d.; BRAYLEY, p. 200.
1330. A man had amongst his other occupation to clean out the lodge at the building of S. Stephen's chapel, Westminster; SMITH, *Antiq. of Westm.*, p. 172.
1335. The workmen at York cathedral were to breakfast, dine, and such like, within the fabric lodge; BROWN, *York Cathedral*, 4to., York, 1838-47.
1339. A list is given of 'the stores in the loge in the cemetery'; BROWN.
1370. All the masons were to be each day at noon 'in the lodge that is ordained to the masons at work in the close beside the church'; BROWN.
1395. At the additions to Westminster hall, the king engaged to find 'herbergeage' for the masons and their companions for all the time they were employed on the works.
1395. Two carpenters were working upon the new house for the masons at Westminster abbey, and on another house in Tothill street; and 15s. 6d. was paid to the 'dauber' for the lodge for the masons and the house in Tothill street.
- 1395-6. 'Logge' occurs in the Exeter accounts; BRITTON, *Exeter Cath.*, p. 98. — The "lodge" is adverted to in the two manuscript "Constitutions" of the latter part of the fourteenth and fifteenth centuries, noticed s.v. Freemason.
1398. Pro tectura del luge in Langwath, 2s. 6d.; SORTES SOCIETY, *York Fabric Rolls*, 8vo., Durham, 1830, p. 132, 260, etc.
- 1410-20. Item logium pro cementariis construemum pro columnis hujusmodi sit inter consistorium et ostium domus capitularis. Item quod in eodem logio sint, ad minus, latomi duodecim. Item ordinatum est quod in antiquo logio sint xx, ad minus, latomi; *Idem*.
- 1421-2. A 'luge of tre' was to be made at Catterick church, for the masons to work in, specified to be of four rooms of syelles and of two hen-forks; ARCHÆOLOGICAL Journal, 1850, vii, 56-9; 292-5.
1426. At Wallerswick steeple, the masons were to be provided with a 'hows' to work in, to eat and drink and to lay in, and to make 'mete' in, to be erected near the place of working.
1429. Custos de la lodge lathomorum; Register of William Molart, Lib. Genl., etc.; PRESTON, *Illustrations*, 1775, p. 215.
1432. A 'loge' was erected in the cemetery garth at Durham.
- 1450 cir. Some parishioners in Suffolk, were to build at their own expense a lodge properly tiled in which to hold the meetings; HORE, *History of Arch.*, p. 211.
- 1470-2. William Hynleley, warden of the lodge of masons at York, worked for twenty-eight weeks in the office of the master of the masons, and subsequently became master mason; BROWN.
1471. 'Lodge of his trade', in contract for work at Freiburg; BUILDERS Journal, viii, 183.
1519. An item occurs for 'mending and repairing old locks and hinges to serve for doors in Peckwork Inn for the mason's lodgings, xviii d. ob.
- 1542-3. At the building of Coventry cross, the freemasons were at their own charges to procure, find and make "an house or lodge for masons to work in" during the time of erecting the cross.
- 1522-3. "To Sanct Petur wark all my tuyllis within the mason lugeh"; SINTES SOCIETY, *York Fabric Rolls*, p. 208.

In the publications referring to Scotland, the following only have been noted.

1443. Agreement "betwix the masonwys of the luge"; p. 39.
1493. Three masons hired for a year, "to remane and abide in thar service, batht in the luge and vteuche"; p. 52.
1498. A mason "to mak gude service in the luge and vteuche to the bigin and fureysing of the queyr"; p. 68.
1507. "Mend and reforme the steppill forsaide ennowe, and vteuch sufficiently and substantiously in ale thingis as efferis"; p. 77.
1547. "For keeping of the glassin vindokis of thair kirk, and the sklatlis of thair luge"; p. 249.

SPALDING CLUB, *Aberdeen Burgh Records*, 4to., Aberdeen, 1844. i.

LODGING and LONGINGS. The name formerly given to a residence consisting of a whole house; it is now generally applied to the particular apartment or apartments in a house occupied by a person or a family. ABBOTS' LODGING. The

Americans have for many years introduced lodging houses on an extensive scale among their arrangements for domestic habits. In 1853 the CIVIL ENGINEER, etc., *Journal*, xvi, 232, noticed the design for a "monster lodging house" at New York, 200 ft. square, and eight stories high, replete with every convenience for about one thousand persons, to cost with the land about 400,000 dollars.

LODGING HOUSE (MODEL). A structure erected for the residence of the poorer, and the labouring, classes. Such buildings now form a very important class; and the subject has been of late years so much discussed in Great Britain, that it is considered only necessary here to annex a list of the chief papers and illustrations, and of the separate publications on the subject having reference, more especially, to the metropolis.

The Metropolitan Association for Improving the Dwellings of the Industrious Classes. Improved Industrial Dwellings Company (Limited), founded upon alderman Waterlow's system. Society for Improving the Condition of the Labouring Classes. Peabody Trustees (founded 1868, Dec., £350,000). Corporation of the City of London. Strand Building Company. Suburban Village and General Dwellings Company (Limited). Miss Burdett Coutts; Mr. W. E. Hilliard; Mr. J. Newson; have among other private persons done much in London. COTTAGE; FARM BUILDINGS; WORKMAN'S DWELLING.

The Act for the well ordering of Common Lodging Houses 1851, is the 14 and 15 Vict. c. 28; extended by 16 and 17 Vict. c. 41, 1853: see also 17 and 18 Vict. c. 103, § 45, and 19 and 20 Vict. c. 103, § 31, 42. The Act for encouraging the establishment of lodging houses for the labouring classes, (or the Labouring Classes Lodging Houses Act 1851), is 14 and 15 Vict. c. 34. The object of the Artizans and Labourers Dwellings Act 1868, (Mr. Torrens' Act), 31 and 32 Vict. c. 130, is to make provision for taking down or improving houses that are unfit for human habitation, and for the maintenance of better dwellings. In the following list, the mark * denotes the papers which have been illustrated.

BUILDER Journal.

| | | | |
|--------|-------|--------------------|---|
| 1849 & | vii | 589 | * Artizans' home, Spicer-street, Spitalfields, by W. Beck |
| 1850 | viii | 31 | |
| 1851 | ix | 311 | * Model houses for four families; Cavalry barracks, Hyde-park (reerected in Kennington park) |
| 1853 | xi | 727 | Houses for the very poor |
| 1854 | xii | 111 | * Metropolitan-buildings; two dwellings by W. Beck |
| 1856 | xiv | 171 | * Lodging houses, Vauxhall-row, Lambeth, by Hunt and Stephenson |
| " | " | 396 | Lodging houses for the industrious classes (money question) |
| " | " | 525 | Model lodging houses in France, by H. Roberts |
| 1850 | xviii | 409 | Review of the dwellings erected by the Society for improving the condition of the labouring classes |
| " | " | 682 | On the progress and present aspect of the movement for improving the dwellings of the labouring classes, by H. Roberts (Social Science Congress at Glasgow) |
| 1862 | xx | 56; 71; 107 | Essentials of a healthy dwelling to the labouring population, by H. Roberts (R.I.B.A.) |
| 1863 | xxi | 821 | On the construction of dwellings for the poor, by H. A. Darbishire (Architectural Association) |
| " | " | 547 | Peabody buildings, Commercial-street |
| 1864 | xxii | 755 | On fireproof construction of dwellings for the working classes, by H. M. Epton (Society of Arts) |
| 1866 | xxiv | 93 | Remarks on the provision of wholesome dwellings |
| " | " | 98 | Improved dwellings in London, by J. Lemon (Architectural Association) |
| " | " | 770 | Social economy, by T. Worthington (Manchester Congress) |
| " | " | 900; 915; 935; 944 | On the problem of providing dwellings for the poor, by R. Kerr (R.I.B.A.), and remarks, etc. |
| 1867 | xxv | 174 | Dwellings for the poor, by T. J. Kilpin (Liverpool Architectural Society) |
| " | " | 188 | Dwellings for working classes in Ireland, by C. Geoghagan (R. I. Architects of Ireland) |

BUILDING NEWS Journal.

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|------|----|----|---|
| 1856 | ii | 11 | Model lodging houses at Carrick-street, Glasgow, by C. Wilson |
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|------|------|------------------------------|---|
| 1860 | vi | 227 | Dwellings for labouring classes, Ireland |
| " | " | 771 | Dwellings for labouring classes, Glasgow |
| " | " | 600; 672; 729; 744; 807; 971 | * Lodgers, lodgings, and reform |
| " | " | 645 | On healthy dwellings and prevailing sanitary defects, by H. Roberts |
| 1862 | viii | 48; 76; 87; 112 | On the essentials of a healthy dwelling to the labouring population, by H. Roberts (R.I.B.A.) |
| 1863 | x | 149; 316 | * Improved dwellings at Leeds |
| " | " | 195-7 | * Improved dwellings for industrial classes at Finsbury, erected by alderman Waterlow |
| " | " | 274 | Improved dwellings for labouring classes, by H. Roberts |
| " | " | 821; 866; 884 | On the construction of dwellings for the poor, by H. A. Darbishire (Arch. Assoc.) |
| 1866 | xiii | 829; 845 | On the problem, etc., by R. Kerr (as above) |
| 1867 | xiv | 12 | Lodgings for the poor, by A. G. R. Heine |
| " | " | 24 | * Model lodging houses, St. Anne's, Soho, by W. Burges |
| " | " | 243 | Lodgings for the poor, by T. Hawksley (Society of Arts) |
| " | " | 290 | * To contain 120 tenements, by H. Rogers |
| " | " | 628 | * In the Paris Exposition |
| 1868 | xv | 552 | * Block of dwellings at Fulham, by J. P. Seddon |

CIVIL ENGINEER AND ARCHITECTS' Journal.

| | | | |
|------|-------|-----|--|
| 1853 | xvi | 215 | Rules for model lodging houses |
| 1857 | xx | 100 | Dwellings for the labouring classes in the metropolis, by G. B. Tremenehere |
| 1864 | xxvii | 124 | * Dwellings for the poor in Commercial-street, Spitalfields, by H. A. Darbishire |

ROYAL INSTITUTE OF BRITISH ARCHITECTS; Sessional Papers.

| | | | |
|------|---------|--|---|
| 1850 | Jan. 21 | | Arrangement and construction of the dwellings of the labouring classes, by H. Roberts |
| 1862 | Jan. 20 | | Essentials of a healthy dwelling, by H. Roberts; and discussion thereon |
| 1866 | Dec. 3 | | On the problem of providing dwellings for the poor; by R. Kerr, and discussions thereon |

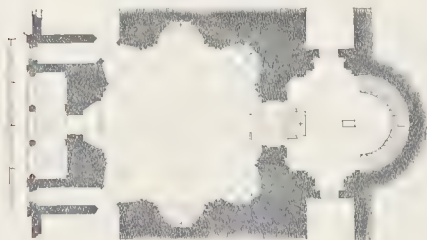
WYLLSON, *Remarks on Workmen's houses in Town districts*, 8vo., Glasgow, 1848. WIGGINTON, *Sanitary Reform: Model Town Dwellings*, 4to., Lond., 1850. GAVIN, *Habitations of the Labouring Classes*, 8vo., Lond., 1850. GRANGER, *Report on Lodging Houses*, 8vo., Lond., 1851. ASHPITEL and WHICH-CORD, *Dwellings (in Flats) for the Labouring Classes*, 8vo., Lond., 1855. ROBERTS, *Dwellings of the Labouring Classes, their Arrangement and Construction*, 8vo., Lond., 1850; which was translated into French by order of the président de la république, 4to., Paris, 1850: *Model Houses for Families*, 8vo., Lond., 1851; 5th thousand, enlarged, 1864: *Dwellings of the Labouring Classes*, 4to., Lond., 1853: *Home Reform*, 12mo., London, 1852: *Improvement of the Dwellings of the Labouring Classes*, 8vo., London, 1859: *Healthy Dwellings*, etc., 12mo., London, 1861: *Progress and Aspect of the Movement for improving the Dwellings*, 8vo., London, 1861: and *Physical Condition of the Labouring Classes*, 8vo. CHAMBERS, *Improved Dwelling Houses in Flats*, 8vo., Lond., 1855. TREMEHERE, *Dwellings for the Labouring Classes*, 8vo., Lond., 1856. HOLE, *Homes of the Working Classes*, 8vo., London, 1866. SOCIETY OF ARTS, *Journal*, passim (May 1864).

Amongst the continental erections for the same purpose are; the *familistery* at Guise near S. Quentin, in France, erected by Godin Lemaire for his workmen and families, described by Tito Pagliardini, in *BUILDER Journal*, 1865, xxiii, 689, 845, and a view, p. 855: *On Dwelling Houses in Bavaria*, a Report to the Society of Arts, in same *Journal*, p. 277. CHADWICK, *Report on Dwellings characterised by Cheapness*, etc., class 93 of the Exposition Universelle, Paris, 1867, is given in the ILLUSTRATED LONDON NEWS *Journal* for 6 July, with illustrations of the emperor's model dwellings, the houses for workmen in Paris, and a portion of the Mulhausen village; besides a notice of matters connected therewith. PENOR, *Les Cités Ouvrières de Mulhouse*, etc., 8vo., Paris, 1867.

LODI. A town near Milan, in Northern Italy, situated on the river Adda, over which is the timber bridge so celebrated by the battle on 10 May 1796. It consists of the town proper

founded 1158, surrounded by ancient walls with four gates; and of eight suburbs: the castle erected in the fifteenth century, was converted 1765-90 into barracks. It is well built, having several spacious, well formed streets; and a large piazza with arcades.

The duomo or cathedral, dedicated to the Assumption of the Virgin Mary, is chiefly of the twelfth century; it is small and much modernized, with a square tower at the south end; the west front is of brick. A canopy with a statue of the Virgin forming the top of the pediment, is noticed by HORE, *Historical Essay*, 8vo., Lond., 1840, p. 272. "The only good feature is its doorway (perhaps brought from old Lodi, MURRAY), which is however very inferior to the western doorway of the cathedral at Cremona, to which it bears no little resemblance", STREET, *Brick and Marble*, etc., 8vo., Lond., 1855, p. 203; who also notices another church with a Pointed brick front, having the central part higher than the sides, although the roof behind is of a very flat pitch. The church of S. Francesco, of the fourteenth century, has a painted groined ceiling, fully illustrated in GRUNER, *Ornamental Art*, fol., London, 1850, pl. 49-50. The church of Sta. Maria dell' Incoronata, commonly called il santuario dell' Incoronata, is said to have been commenced 1487 from the designs of Bramante Lazzari, by Giovanni Battagrio of Lodi, and consecrated 1501; the nave is in



N.B.—The scale is considered to be correct.

the form of an octagon with a choir having an apsidal end beyond; a plan is given in LECLERE, *Recueil*, fol., Paris, 1826, pl. 28; GRUNER gives pl. 51 details, of the sixteenth century, of wood-carving to the *cantoria* or singing gallery; and pl. 52-5 the painted domes by Callisto Piazza called Toccagno of Lodi. The entrance of the convent formerly belonging to the *padri dell' Oratorio* is formed of an arch said to have been brought from old Lodi, but the inscriptions on it do not sanction this statement of its antiquity.

Among the other buildings may be noticed, the remaining old portion of the *vescovado*; and the monastery of S. Vincenzo, now partly destroyed, both designed by M. Bassi about 1570-80; the town house; the episcopal palace; the palazzi Barni and Merlini; the theatre; the lyceum and gymnasium; the diocesan seminary, and several other schools; two good and well endowed hospitals; with the usual courts and public offices. WEBB, *Continental Ecclesiology*, 8vo., London, 1840, p. 230, only mentions two churches. MOLOSSI, *Memorie d'Alcuni Uomini Illustri*, 4to., Lodi, 1776; and *Descrizione della Città*; D. LODI, *Discorsi Historici*, 4to., Lodi, 1629 28. 50. 96.

Lodi vecchio, about five or six miles distant, had risen to some importance under the Romans, under the name of Laus Pompeia, but was entirely destroyed in 1111-2 by the Milanese. Some architectural features are given in MOLOSSI, *Memorie*.

LOESSL (FRANZ) born 1801 at Brünn, practised at Vienna, where 1830 he designed the music hall; he built 1831 the new *badhaus* at Ischl in Upper Austria. 26.

LOEZAR (PIERRE) of France, is mentioned 14 Sept. 1399, in the list of the artists employed on the cathedral at Milan, by FRANCHETTI, *Storia*, fol., Milan, 1821, p. 141.

LOFT (It. *solojo*; Sp. *desvan*, *guardilla*; Fr. *grenier*; Ger. *boden-kammer*). A term formerly in use for an upper room as

"lofts or solars" in HORMANUS, *Vulgaria*, 4to., Lond., 1519, p. 241; SURRES SOCIETY, *Finchale Priory*, 8vo., Newcastle, 1837, in a compotus of 1488-9, p. cccclxxxii, and in Glossary at end. LOCUS.

It has thus come to be applied to the top floor of a house, as COCK-LOFT; or to a story in a roof over stabling, as HAY-LOFT. An upper store room in a theatre is called a *loft*. It was also applied about the period of the Reformation to a gallery as in a church, and it is still sometimes so used in Scotland: the churchwardens' accounts of S. Martin's church at Birmingham, state that the galleries consist of "a new south loft next the pulpit", a "west loft", an "old loft on the south side", the "scollers' loft" and the "north gallery next the scollers' loft"; BUILDING NEWS *Journal*, 1856, ii, 38. A gallery or platform (TRABES) over a chancel screen received this name, and when carrying a cross, was called a ROOF-LOFT. A gallery or "watching loft" (EXCURTORIUM), from whence the monks could observe the shrine in a church, remains at S. Alban's (*Illustrations*, 1867, part 1); at Westminster; at Lichfield (KING, *Western Cath.*, 8vo., Lond., 1864, p. 296); at Worcester; and at Canterbury. At Norwich, a gallery over the north choir aisle was probably for watching the sepulchre light, KING, *Eastern Caths.*, 8vo., Lond., 1862, p. 131; at Ely, the upper portion of the tomb of bishop Hotham may have served as the watching chamber for the shrine of S. Etheldreda; it resembles in its arrangements the watching chamber in Oxford cathedral, *Ibid.*, 209. In the lesser transepts of Lincoln cathedral, formerly stood what a survey of 1641 calls the 'watching chamber', "a chamber of timber where the searchers of the church used to lie; under which every night they had an allowance of bread and beer. At the shutting of the church doors the custom was to toll the greatest of Our Lady's bells forty tolls, and after to go to that place and eat and drink, and then to walk round and search the church." Is it possible that this 'chamber of timber' can have been originally the watching chamber attached to S. Hugh's shrine? asks KING, *Eastern Cathedrals*, 8vo., Lond., 1862, p. 304. Another chamber for such a purpose may be seen over the north porch at Exeter. Minstrels' lofts or galleries remain at Exeter, Malmesbury, Winchester, S. Mary Ottery, Gloucester, and perhaps Westminster; WILCOTT, *Church*, etc., *Arrangement*, read at the Institute of British Architects, *Sessional Papers*, 1860-61, p. 57; reprinted in *Builder Journal*, xviii, 812.

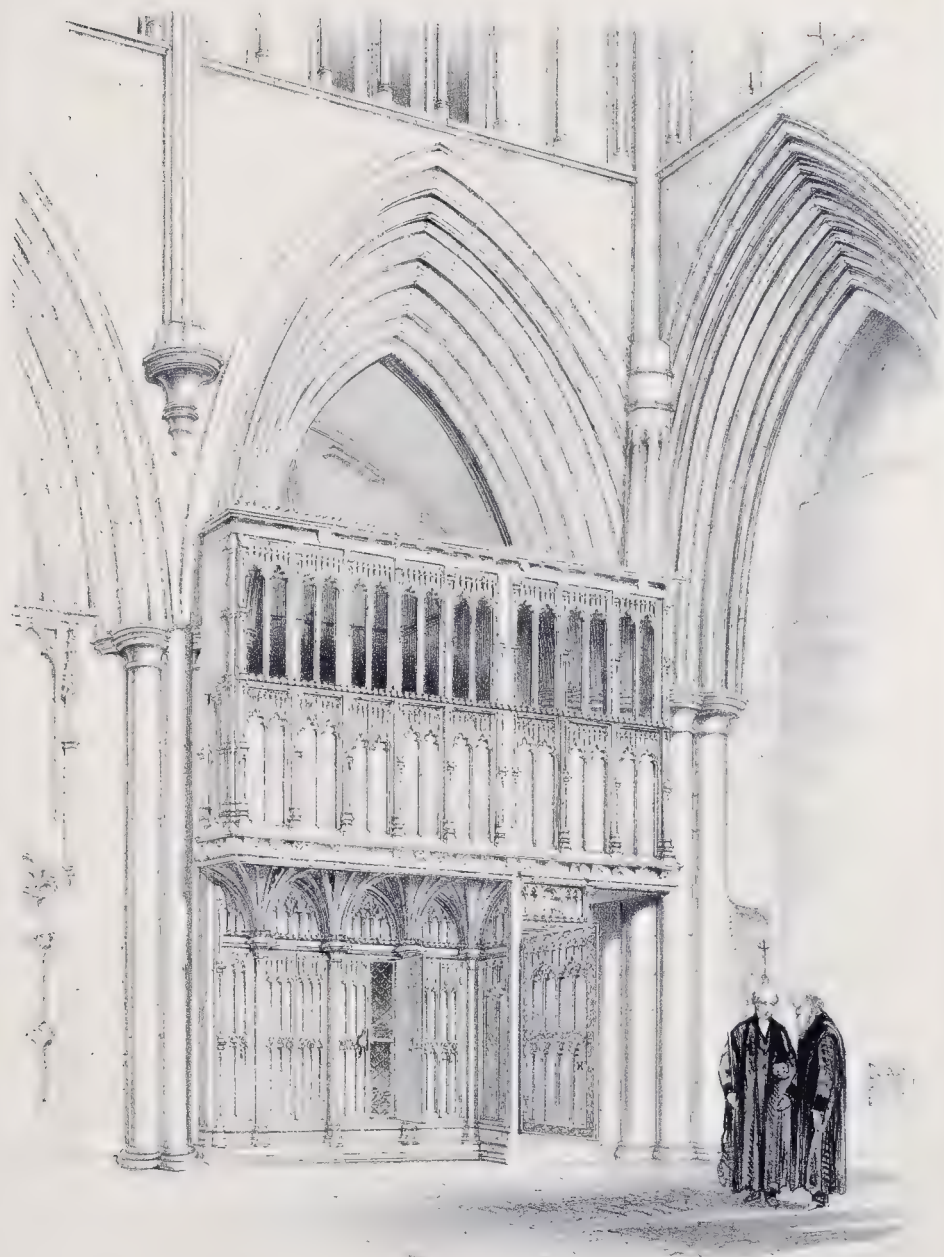
LOG. The name given to a tree when cut down for timber before it is squared into a BALK; and likewise to untrimmed slates, as "slates in the log." A short round limb of a tree cut for firewood is also called a log. PUT-LOG.

LOG, RO. A term occasionally used instead of 'to rock' a stone or other article.

LOGAN. A portion of rock, which, from natural or artificial causes, is so balanced as to be easily shaken; whence it is as often called a ROCKING STONE as a logan stone.

LOGE, see LODGE.

LOGEIUM (Gr. *λογεῖον*). This term meant a place where persons met for the purpose of taking counsel together, according to the author of the *Lexicon* at the end of the VITRUVIUS, 4to., Udine, 1825, who states that it denoted a *δικαστήριον* or court of law, and that it also was the name given in ancient theatres to the part appropriated to the players. It is represented to mean the part assigned to the chorus and the least important performers, in AQUINUS, *Vocabularium*, 4to., Rome, 1734, p. 135; whereas VITRUVIUS, v, 8, says "pulpitum quod *λογεῖον* appellant" adding that the term was derived from *λόγος*, "a word", because there the tragic and comic actors delivered their parts while the other performers exhibited in the orchestra. The origin of the It. *loggia* is suggested by these senses, especially as the supplementary volume to STUART and REVETT, *Antiq.*, fol., London, 1830, shows that DONALDSON, *On the form*, etc., of the Greek Theatre, having collected instances of the use of these buildings in some Greek cities for general



Looking Left,
Chapel of St. Alban, ST ALBAN'S ABBEY, Hertfordshire

Lithographed for the Society by R. D. Bell, Brod. Sign. B. 1868



assemblies upon public affairs, assumes that the logeum was occupied by the orators on such occasions. The use, situation, and size, of this portion of a theatre, however, have been more contested than was needful if attention had been paid to the statements in VITRUVIUS, v, 6 and 8. In the latter place, after spacing the Greek plan of a theatre by three squares within the circle of the orchestra, he fixes the front of the scene as a tangent to the circle, and the side of that square which is nearest to the scene as the "finitio proscenii": this leaves the depth of the logeum from the "finitio" to the "frons scenæ" equal to one-seventh of the diameter of the circle. In the former place, after spacing the Roman plan of a theatre by four triangles within the circle of the orchestra, he fixes the side of that triangle which is nearest to the scene, as the "scenæ frons", and a diameter parallel to it as separating the "proscenii pulpitum et orchestræ regionem": this leaves the depth from the orchestra to the front of the scene equal to one-fourth of the diameter of the circle. He observes that the size of the logeum or pulpitum is greater on the Roman, than on the Greek, plan; and gives the reason, viz., that the Roman senators occupied the orchestra, and all the players had the "scenæ"; while the Greek audience left the orchestra to those players who were subordinate to the actors on the "scenæ", and termed these performers respectively the *thymelici* and the *scenici*. He further directs that consequently the height of the Roman pulpitum should not be more than 5 ft., while that of the Greek logeum might be made from 10 to 12 ft. As it is evident from this author that the difference between the meaning of the words *proscenium* and *logeum* merely consisted in the application of the latter technically for the central portion of the former by the few (at most four) actors who appeared upon the Greek stage, it is needless to enumerate the attempts made by his commentators to find separate localities for the places so called.

LOGGIA. An Italian word introduced into the English language, having meanings that are now apparently inconsistent, but which naturally grew into use. If it be derived from the *logeum* of the Greeks, there is no difficulty in understanding that the appellation "palazzo della loggia" of the broletto or town hall at Brescia (*Illustrations*, 1861, pt. ii) must refer to the pulpitum or place from which the magistrates made their speeches to the people; whether that place was the roof, or a window, or the balcony now called *ringhiera*; (the bishop, standing upon the porch of the church of Sta. Maria di Collemaggio at Aquila is protected by an iron rail while reading annually the bull granted 1294 in favour of that city): and that a similar reason gave the title to the "loggia degli Osii" at Milan. The name of the "coperto de' Figni" in that city suffices to show that in the fourteenth and fifteenth centuries a loggia was not always a covered walk.

Closely connected with this meaning of "pulpitum" is the use of *loggia* as a terrace, and *loggione* as a great terrace or uncovered *AMBULATORIUM*, such as the upper part of the loggia de' Lanzi at Florence, a name which conceals the original civic purpose of that building.

As soon as the terrace was covered with an awning or other defence against the sun and rain, the loggia became a resting-place, whether arbour, bower, or harbour, as evidenced by the Fr. *loge*, which represents *loggia* as a box at a theatre (apparently first used in that sense on the construction 1618 of the teatro Farnese at Parma), and the Fr. *logis* which is equivalent to *loggia* as a lodge, *loggetta* as a small lodge, *loggione* as a great lodge, and *loggiamento* as an hostel. **LOGGE.** The description of the work by G. (Pippi) Romano in the garden of the palazzo del Tè at Mantua, shown in the *Illustrations*, 1850-51, pt. i, 60 and 61, s. v. **LOGGIA**, as a casino or loggia will make this explanation easily comprehended. Another celebrated example is the loggia, having its walls decorated 1540 by Doceno with caryatides, animals, birds, fruits, and flowers, in the garden of the palazzo di Paolo Vitelli at Città di Castello.

ARCH. PUB. SOC.

It appears from a note in TEMANZA, *Sull' antica pianta*, fol., Venice, 1781, p. 30, that *liagò* (perhaps derived from the Gr. ἡλιακόν, Lat. *solarium*, as the construction thus denominated generally had a south aspect) was the proper name for the "loggia di legno a solajo", always a portion of the old Venetian dwellings, which was a species of loggia, being roofed, open in front, without shutters or glass, closed on the back and sides, and approached by a wooden staircase from another small loggia below it. Such a solar, as shown in the *Illust.*, 1854-5, pt. ii, pl. 116, s. v. Belvedere, is a true bower: it might serve as a gazebo, like the wings of a palace in the Strada Nuova, *Illust.*, 1851 52, pt. i, 80, s. v. Genoa; or like the open arcades at Perugia, *Illust.*, 1858-9, s. v. Entrance-gate; and from these renderings of a *liagò* or solar in the smaller examples given s. v. Belvedere, transition is rapid to the ambulatory over the great niche (which is in itself a loggia or solar) at the Vatican. Another example of the ambulatory on a terrace is afforded in the vaulted corridor communicating by eleven openings with the terrace in the palazzo Lancellotti at Velletri, as shown in the *Illustrations*, 1850, pt. i, 37, s. v. Staircase.

The term "loggia" for such an extensive *liagò*, whether on a flat roof, a story of its own, or a terrace, would naturally be applied to any covered ambulatory, whether on an upper story, or on the ground; and whether having one or more open sides supported by arches, columns, piers, or pillars, separately or combined. Thus the term is explained by COSTA, *Diz.*, and DU CANGE, *Gloss.*, as an open building upon piers or columns, equivalent to the Lat. *ambulatorium*, *pergula*, *peristylum*, *porticus*, and *zyxus*: in this sense the name is now known in connection with the celebrated vaulted corridors at the Vatican which were decorated by Raffaello, but have recently been enclosed with glass to protect the frescos: and if such a mere corridor with a pierced or closed parapet be a loggia, then the name is fairly applicable to such designs as that in the quadrangle of a house in the via Analfitania at Syracuse, *Illustrations*, 1852, pt. iii, 89, s. v. Court; or that on the first floor of the house of the provincial assembly at Barcelona; or the two stories of the centre of the dey's palace at Algiers, *Illustrations*, 1852, pt. iii, 87-8, s. v. Court. A similar remark suggests itself with regard to the two stories at Caprarola, *Illust.*, 1849, pt. i, 6, s. v. Cortile; to the sala at Vicenza, *Illust.*, 1854-5, pt. ii, 123, s. v. Basilica; or to the rectory house at Montepulciano; or to the lower story of the corpo di guardia at Padua; these last examples are given in the *Illust.*, 1850, pt. ii, 45, s. v. Façade. If it be proper to call that lower story a "loggia", there is no impropriety in giving the name to the lower story of the palazzo Fibbia at Bologna, *Illust.*, 1851, pt. i, 58, s. v. Façade; or to that at Loreto, *Illust.*, 1850, pt. i, 33, s. v. Loggia; or to subjects illustrated s. v. Arcade, Cloister and Cortile; or to the vestibule of five arches, attributed to Bramante, which is attached to the cathedral at Spoleto, *Illust.*, 1849, pt. ii, 9, s. v. Loggia: and it is difficult to understand why the vestibule to the basilica of S. Marco at Venice should be called an *atrio*, rather than a loggia or narthex, by the archaeologists of Venice. With regard to the doge's palace, now frequently said to be built upon a loggia, in that city, the *Handbook* copies the following words, "the lower gallery, or piazza, under the palace, is called the *broglito*", a name that probably alludes to the "noise" there, because this vaulted arcade was the situation chosen by the nobility until the termination of the republic, for public conversation among themselves: the author of the curious contradiction, above quoted, to the words of SERLIO, hereafter mentioned, may have deemed the terms piazza and loggia to be as convertible in Italy, as in Covent-garden, for a covered promenade.

The word loggia furnishes another proof, amongst many, that the name of a part is easily given in popular parlance to the whole of a building. This transfer appears to have existed in the case of another *LESCHÉ* or place of public resort, viz., the loggia de' Banchi at Genoa, where the sides, only occupied by sixteen columns at the end of the sixteenth century, have

long been fitted with glazed frames, converting it into an enclosed hall.

There remain to be noticed, *loggia* as a gallery, *loggetta* as a small one, *loggione* as a great gallery, and *loggiate* as a covered gallery; this application is casually shown by SERLIO, *Opere*, 4to., Venice, 1619, b. vii, 114, 158, who states that *galeria* means a "loggia finestrata per passeggiare", wherein "finestrata" seems to mean "windowed", rather than "having two or more openings in close connection" as the word is technically used by SELVATICO, *Sulla Architettura*, etc., 8vo., Venice, 1847, p. 117. The employment of *loggiate* in CORDERO, *Dell' Italiana Architettura*, 8vo., Brescia, 1829, pp. 81, 123, and 147, is worth attention.

Such an arcade as surrounds many Romanesque apses, e. g. at the church of Sta. Maria Maggiore at Bergamo, *Illust.*, 1854-5, pt. i, pl. 107, s. v. Apse, might be called a loggia as well as, or better than, some other architectural features to which this name has been given.

LOG HUT. In the United States, the huts used by the husbandmen in the interior parts of the country are built of logs of timber, and are so simply constructed that they are rendered habitable in three or four days. The logs, which are 20 or 30 ft. long and 4 or 5 ins. diameter, are laid one upon another, crossed at the ends, and confined by notches. The interstices are filled with clay. The roof is formed of lighter sticks of the same length, gradually approximating on each side and supplying the place of rafters; to these the shingles are attached by small wooden pins. Two doors, which frequently serve instead of windows, are cut directly opposite to each other in the middle of the walls. The chimney is at one end of the house, which is divided by a partition into two apartments. The barns and stables are similarly constructed, but less carefully closed. White pine was preferred, but as it became rare, it is partly replaced by the black and hemlock spruces, which are cheaper and more abundant; MICHAUX, *North American Sylva*, 8vo., Philadelphia, 1819, iii, 239. An illustration is given in CORPS OF ROYAL ENGINEERS, *Aide Mémoire*, 8vo., London, 1850, ii, 257, s. v. Hut. The Swiss *chalet* is a log hut of a superior sort. HUT; JOINT.

LOGWOOD. The English name of the HÆMATOXYLON.

LOIDI (H. DE), see LOYDI (H. DE).

LOIS (JACOB), sheriff 1664 of Rotterdam, planned 1662-64 the gemeene-lands-huis in that city for the province of Zeeland, where this vast fabric is the finest edifice. 24.

LOIS MONTEAGUDO (DOMINGO ANTONIO), commonly called don D. A. Lois, was born 1723 at Alen in Galicia. He studied under V. Rodriguez at Madrid, where he obtained 1753 and 1754 prizes from the academy of S. Fernando, which also sent him 1759 for six years to Rome, and elected him a member 14 April 1765. As maestro mayor of the cathedral at Santiago in Galicia he constructed its fachada de la Acebaderia, incorrectly commenced by Sarela, from the design made 1764 by V. Rodriguez; whose plans 1771 for the collegiate church at Santa Fe in Granada, and 1775 for the tower, capilla mayor, coro, and retablos of the parish church at Losa in Granada, were also carried into execution by him. The date of the round church constructed by him at Montefrio, from his own design, is not given. He died 1786 at Santa Fe. 66.

LOISON or LOYSON (. . .) a Jesuit, chancellor of the university of Bamberg, designed about 1710 for count Schönborn, bishop of Bamberg and archbishop of Mainz, the Weissenstein chateau at Pommersfelden, near Bamberg, one of the finest country seats in Germany. The style resembles that of the palace at Versailles; the building is of the form of the letter E, having in the centre a magnificent entrance hall and staircase; it comprises a fine library and picture gallery; a banquetting hall floored with marble; and a chapel; *Handbook for Southern Germany*, 1857, p. 128. 28.

LOISON (. . .). His residence built 1801 in the rue des Fontaines at Paris, is given in KRAFFT and RANSONNETTE,

Plans, etc., Maisons, etc., à Paris, fol., Paris (1802), pl. 60. KRAFFT, *Recueil d'Architecture Civile*, fol., Paris, 1812, pl. 69, gives a country house at S. Germain, near Paris, restored by him as "architecte et projecteur."

LOMAZZO (GIOVANNI PAOLO), born 1538 (not 1558 as in some authors) at Milan, chiefly practised as a painter; and published *Trattato dell' arte della Pittura, Scoltura, ed Architettura, diviso in sette libri*, etc., con una tavola de' nomi—*antichi et moderni*, 8vo., Milan, 1584; 1585; 1590: and in BIBLIOTECA ARTISTICA, 8vo., Roma, 1844, i-iii. Five out of the six books were translated as *A Tracte containing the Artes of curious paintinge, carvinge and buildinge*, etc., by R. HAYDOCKE, fol., Oxford, 1598. This work was one of the few early publications on art which guided taste in England. He died in 1600. 1. 112.

LOMBARD ARCHITECTURE. This term is used by writers as meaning any one of the eight following subjects; nearly every one of which is often confused with one or more of the others; a treatment of them in detail is therefore absolutely needful. i, the style prevalent during the eleventh century in Normandy; ii, the architecture seen in the mediæval structures in Lombardy; iii, the style prevalent in civilised Europe from the time of Charlemagne to the thirteenth century and (in some countries) later; iv, the particular portion of that style, which the Romanesque works in Italy exemplify; v, the buildings erected during the Romanesque period in Lombardy; vi, the edifices of any period in Lombardy; vii, the architecture in vogue in Italy under the Lombard princes; viii, the style of the *risorgimento* in Venice. Each of these subjects will be noticed in the following remarks, but it is essential to give a preliminary definition of the region expressed by the word "Lombardy", according to its ancient, its mediæval, or its modern, extent.

The ancient Lombardy, if that term be employed for the part of Italy which was once under the (Longobardic) Lombard rulers, was created piecemeal: in 568 it extended only from the Julian Alps to the Apennines; in 586-92 they added the country as far as Benevento, leaving the Byzantine sovereignty extending over the rest south of the Abruzzi, with Rome, Genoa, Padua, Ravenna, and a few other cities: in 653 only Rome and Ravenna remained as outlying portions of Greek Italy: in 688-700 the Longobardi intruded into the Terra di Otranto; and in 751 they tried to appropriate Ravenna: after 774 the duchies of Friuli, Tuscany, and Spoleto, were no longer called, although to some extent they remained, Lombard; but as remarked by GIBBON, *Decline*, in his summary of the power of the "court of Lombardy", the dukes, and at length the princes, of Beneventum survived the monarchy, and propagated the name of the Lombards; from Capua to Tarentum they reigned near five hundred years over the greatest part of the present kingdom of Naples.

The mediæval idea of "the plain of Lombardy" embraced almost all the territory called Gallia Cisalpina by the Romans, which comprised very nearly the districts obeying the cities that formed the "Lombard League" from 1167 to 1176; viz., Bergamo, Bobbio, Bologna, Brescia, Cremona, Ferrara, Lodi, Mantua, Milan, Modena, Novara, Padua, Parma, Piacenza, Ravenna, Reggio, Rimini, Tortona, Treviso, Venice, Vercelli, Verona, and Vicenza, joined against Pavia, the Longobardic capital, which was then adhering to the German empire. That extent is generally understood by those who speak of Lombardy in 1400 as "the Milanese", i. e. the power supreme over the country between the hills of Montferrat and the lagunes of Venice, besides Genoa, Lucca, Pisa, Siena, Perugia, part of the Romagna, and Bologna: but it would be very inconvenient to include the architecture of these last districts in the consideration of LOMBARD-GOTHIC and LOMBARD-ROMANESQUE.

The modern use of the word has two slightly differing meanings: "Lombardy" has been held to apply *properly* only to the duchy of Milan (as diminished in the fifteenth century to

FIGURE 1

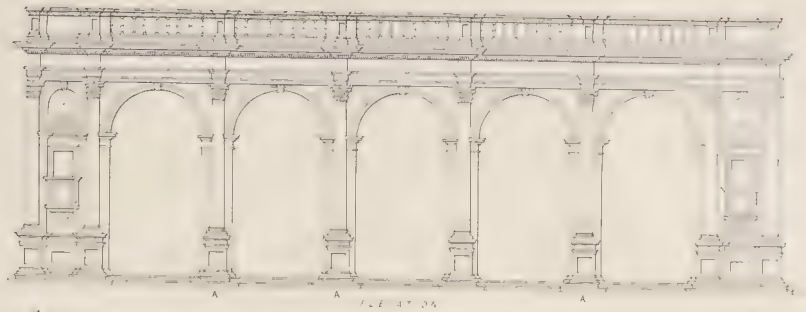
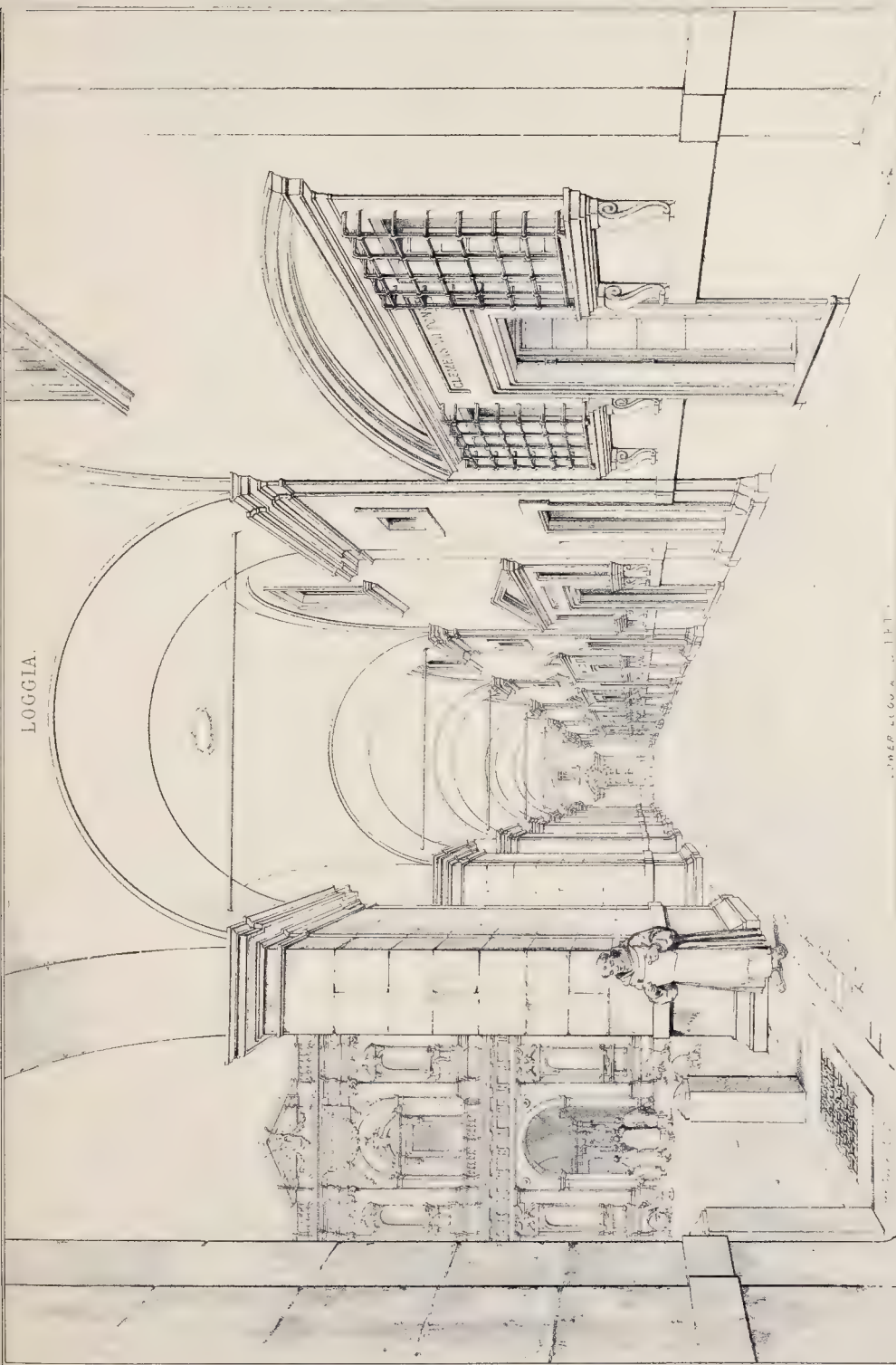


FIGURE 2
ATRA DIAL



LOGGIA.





LOGGIA.

Fig. 1

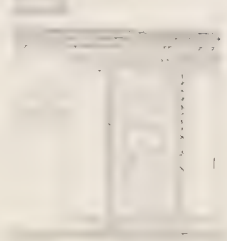
ELEVATION
Face E. F.

Fig. 2



ELEVATION

Fig. 3



ELEVATION

Fig. 4

DETAIL OF ARCHITECTURE



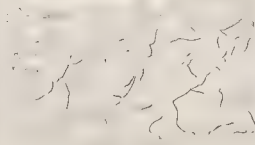
Fig. 5



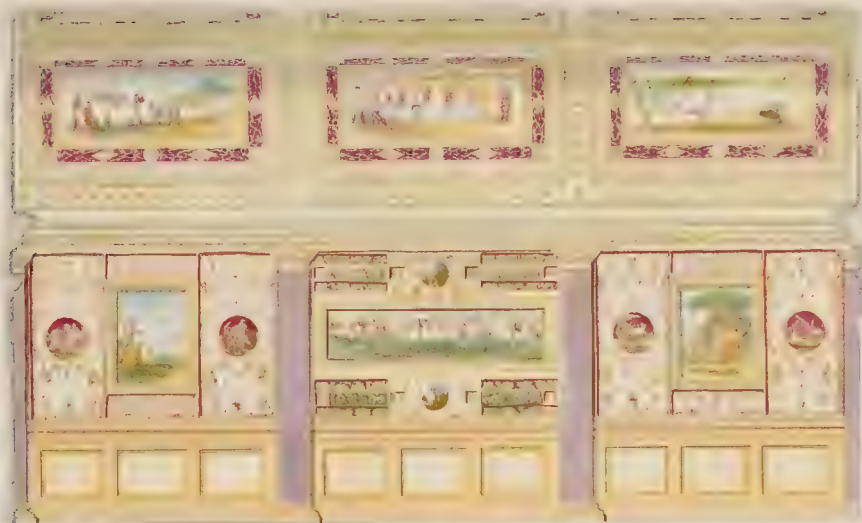
Fig. 6



Fig. 7

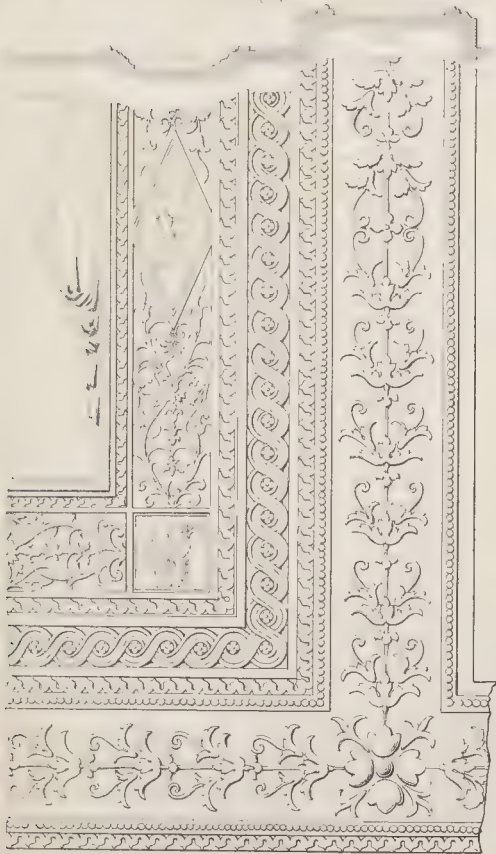
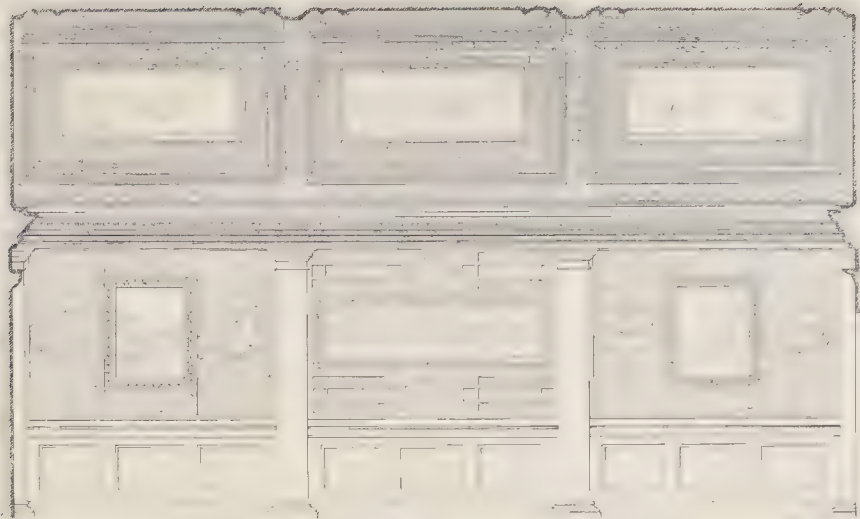
In side comparison
Fig. 8GARDEN LOGGIA
PALAZZO DEL TE — MANTUA

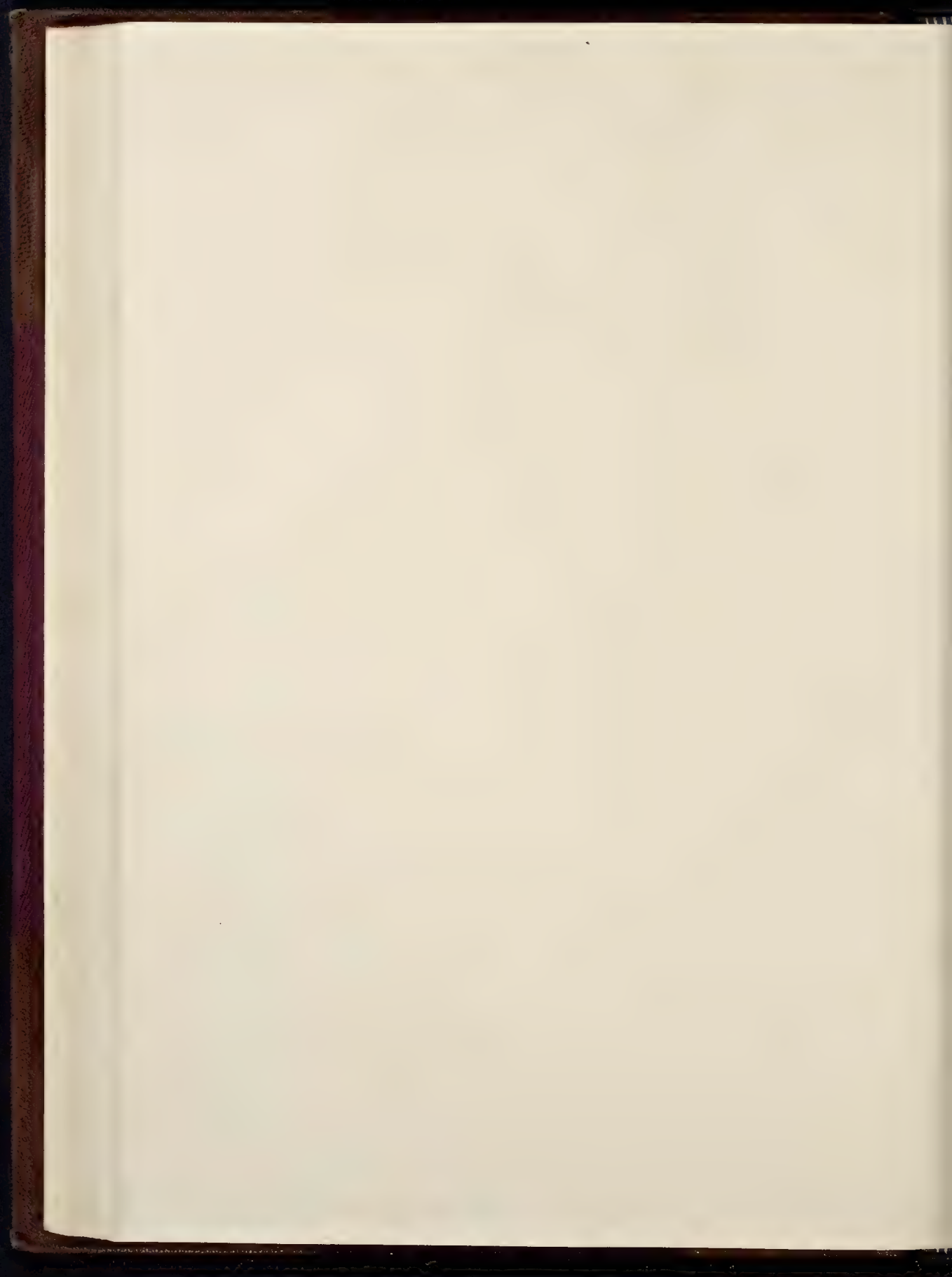


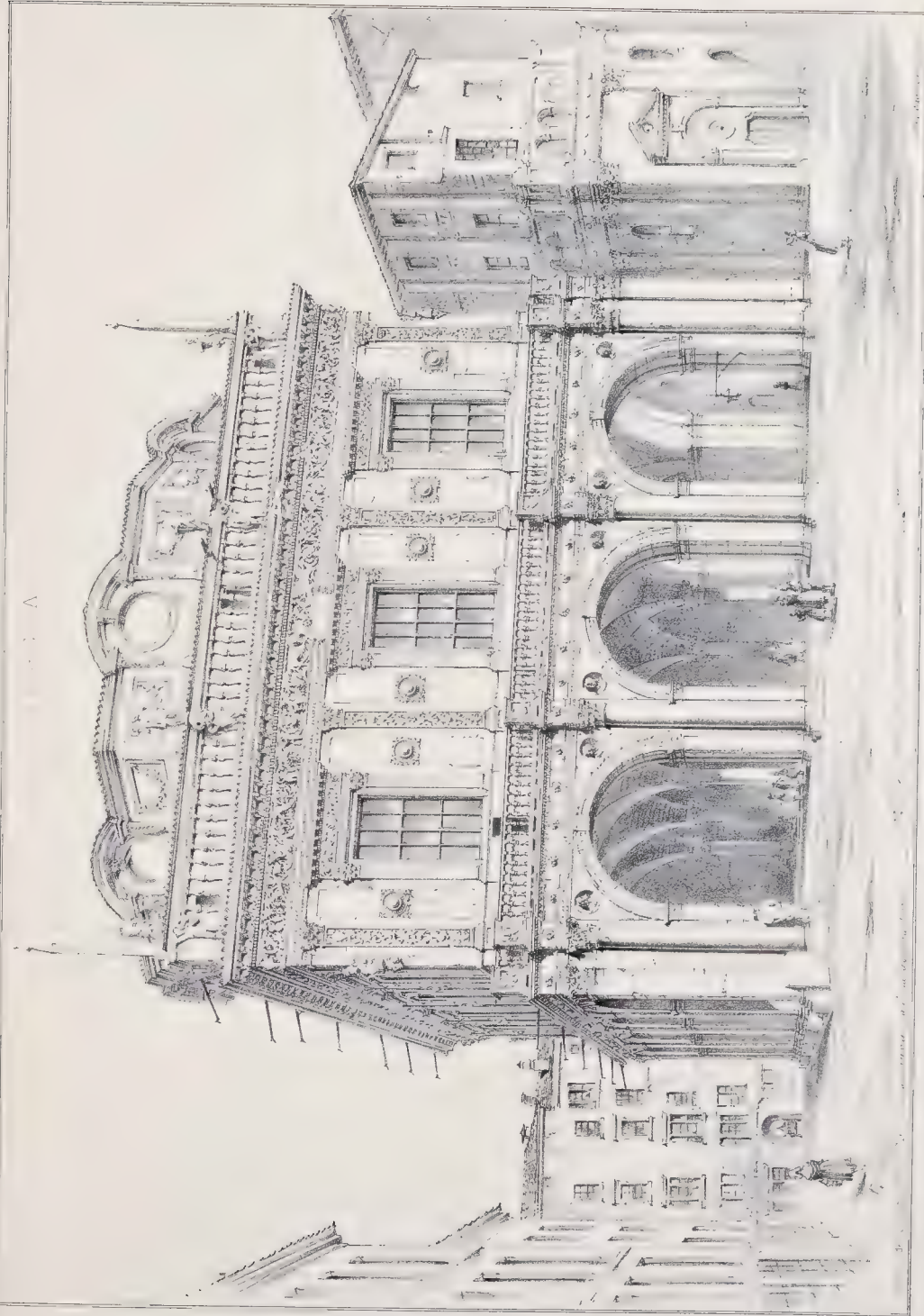




LOGGIA









the region between the Sesio and the Adda) falling 1535 to the Spaniards, with the Austrian annexation 1703-4 of the duchy of Mantua, which continued it to the Mincio; that district was reduced 1713 on its western boundary to the Ticino. The term is confined by many recent writers to the territory which, including Bergamo, Brescia, Como, Cremona, Lodi and Crema, Mantua, Milan, and Pavia, with Sondrio or the Valtellina, formed 1814 part of the Lombardo-Venetian kingdom of the Austrian empire, and was bounded by the lago Maggiore, the river Po, and the lago di Garda. By the excision of Novara and Sondrio, modern Lombardy became a speck in the map of the Lombardy of ancient, and even of mediæval, times: it now no longer exists.

The statement that Pavia with the province of Bergamo together were called "la Lombardia-Venitienne", occurs in SEROUX D'AGINCOURT, *Histoire*, fol., Paris, 1823, p. 39. The chroniclers speak of the 'Italia quæ et Longobardia dicitur', which is defined in Charlemagne's Will as being bounded by the Ticino and the Po as far as the territories of Reggio and Bologna.

For the employment of the words 'Lombard architecture' as stated in the first subject, CORDERO, *Dell' Italiana Architettura*, 8vo., Brescia, 1829, p. 134-8; may be cited: he says that the church at Mortain, in Coutances, founded probably 1082 but certainly consecrated before 1093, exhibits the transition from the style of the round arch to that of the pointed arch; and that the style of the previous period, as seen in the church at Cerisy founded about 1030 and in others later at Mont S. Michel, Bocherville, and Jumièges, is that of the two earliest churches at Caen, which are the true types of the style that was generally called Lombard out of Italy (because the terms Lombard and Italian were equivalent) until it took the name of Norman, which it still retains.

The second subject, viz., the architecture of the mediæval structures in Lombardy, is obscure and equivocal, especially when conveyed in such vague terms as those contained in the following quotations, two-thirds of which mention places that did not belong to the Lombardy of modern geography.

The *Handbook for Travellers in Northern Italy*, 8vo., Lond., 1846, p. 235, says, that the town of Este "has a Lombard aspect, most of the houses are supported by arches": p. 409, that in the interior of the duomo built 1063 at Lucca, "the tower arches of the nave are Lombard": p. 399, that the style of the cathedral consecrated 1108 at Modena, "is Lombard throughout": and p. 379, that the interior of the duomo consecrated 1106 at Parma, is partly "in a fine Lombard style", while "the peculiar Lombard style will be recognised" in its great portal.

The same book states, p. 173, that the front of the church 1464-93, at the Dominican monastery of Sta. Maria delle Grazie, at Milan, "is a fine specimen of Lombard-Gothic of brick, with ornaments of terra cotta"; p. 372, that the cathedral consecrated 1132 at Piacenza, "though not of remote date" is chiefly "in an ancient Lombard style", while "the interior is in a Lombard style"; and p. 204, that "there certainly exists nothing finer of the Lombardic chisel" than the façade begun 1473 of the Certosa, near Pavia. It affirms p. 11, that the church of S. Antonio di Rinvorso consecrated 1121 near Rivoli "is Gothic, and built of moulded brick; the pinnacles and all other ornaments being formed with much delicacy: this is a specimen of a style almost peculiar to Lombardy, of which the traveller will find the full display at Milan, Piacenza, and Pavia." These four last passages may be compared with one p. 132, which says, that the façade 1460-1526 of the cathedral at Como is Gothic with the exception of "the three entrance doors, which are round-headed, and of the richest Lombard style."

The *Handbook* also says, p. 209, that the church of S.

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Michele at Pavia, which CORDERO insists could not have been built before 1000, "may be taken as a specimen of a style which the Lombards adopted for their own"; this means the style of the seventh and eighth centuries, as appears by a following passage, viz., "it is impossible not to see in the Lombard churches of Pavia, the originals of the churches in the valley of the Rhine: the Lombard style was introduced into the Rhenish provinces by the Carlovingian sovereigns of Italy, who,"—"at Pavia, could not fail to remark the churches with which it had been enriched by the Lombard kings."

The responsibility for the latter sentence belongs to GALLY KNIGHT, *Ecclesiastical Architecture of Italy*, fol., Lond., 1842, who is given in the *Handbook* as the author of its information, p. 555, that the church commenced 1013, in the monastery of S. Miniato al Monte, near Florence, deserves notice, because it "in the style of its architecture, dismissing the Lombard altogether, seeks to return to Roman proportions": p. 212, that the church of the abbey cir. 1136-1200, of Chiaravalle, "is in the Lombard style": and p. 377, that the oldest part of the church at Borgo San Donino "is in the Lombard style; but the very curious and rich façade belongs to times subsequent to those of the Lombard," and "cannot be older than the twelfth century."

Upon the third subject it seems only necessary to observe that HOPE, *Historical Essay*, 8vo., Lond., 1835, 2nd edit., chap. xxii, p. 221-305, seems to have been the first of the English writers who used the term "Lombard" for an European style. He assumes that Lombardy, as the country in which associations of freemasons were first formed, and which from its more recent civilisation afforded few ancient temples whence materials might be supplied (both these reasons being unfounded), "was the first, after the decline of the Roman empire, to endow architecture with a complete and connected system of forms, which soon prevailed wherever the Latin church spread its influence, from the shores of the Baltic to those of the Mediterranean; in part adopted from the more ancient Roman and Byzantine styles, in part differing from both—neither resembling the Roman basilica, nor the Greek cross and cupola" (the last eleven words require explanation or correction): he adds that "this style of architecture, in conformity to the general custom of calling things (until revolving ages obliterate the sense of the obligation) by the name of the last and nearest country whence they were imported, the French—the nearest neighbours to the Italians—have called Lombard; an appellation, indeed, expressing the place in which this new system of Latin church architecture was first matured, and, therefore, so universally appropriate, that I shall adopt it." From Upsala to Bari and Tarragona, from Gloucester to Vienna, he gathers features for his "attempt to describe the peculiar form, whether borrowed or imitated, collected into a single connected system", which he calls the Lombard style; but which is now more reasonably known as ROMANESQUE. That wide application of the words is somewhat followed in BRITTON, *Diet.*, 8vo., Lond., 1838, s. v. who explains 'Lombard architecture' as the style which arose in Lombardy after the decline of the Roman empire, was thence introduced into France, and afterwards (variously modified) proceeded into Normandy and England. Both these writers by "the decline of the Roman power" mean the sixth century, as fixed by D'AGINCOURT: but the seventh century seems to be preferred by SELVATICO, *Sulla Architettura Italiana*, 8vo., Venice, 1847, p. 66; and the eighth century by CORDERO, pp. 69 and 316.

It is to be presumed that the above will sufficiently explain the unusual language of the definition given in the *Glossary* at the end of NEWLANDS, *Carpenters' Assistant*, 4to., Lond., 1860, where 'Lombard architecture' is said to be "a name given to the round-arched Gothic of Italy, introduced by the conquering Goths or Ostrogoths, which superseded the Romanesque, and reigned from the eighth to the twelfth century."

The fourth subject embraces that particular portion, of the Romanesque style, illustrated by examples in Italy. As soon as the followers of D'AGINCOURT and HOPE saw the convenience of using the term 'Romanesque' instead of 'Lombard', they confined the application of 'Lombard architecture' to the buildings erected in Italy between the extinction of Roman, and the appearance of Pointed, art; this was done 1839 in the PENNY CYCLOPÆDIA, s. v., Lombard architecture, which was probably written by the late W. H. LEEDS as a consequence of his translation of MÖLLER, *Memorials*, 8vo., London, 1836. In the last named publication, pp. 14-19, the German author considers erroneous the ascription of an individual and peculiar style to the Goths and Lombards in Italy and Spain, to the Franks in Gaul, and to the Saxons in England; more erroneous the idea that the Lombards (Longobardi) had any influence even till the eleventh century, upon the architecture of the west and north of Europe; and still more erroneous, the appellation of Lombardic given to the style of church building which prevailed in France and Germany during the middle ages. But as even an employment, so restricted by LEEDS, was open to objection from those who would have to describe the Lombard architecture of Florence, Lucca, Naples, Pavia, Pisa, Rome, Sicily, and Venice, more recent writers have found the propriety of using, instead of it, the term ROMANESQUE (either simply or with the addition) of Italy.

As to the fifth subject, it will be sufficient to observe that the division of the Romanesque style, to which the buildings in the districts of the Lombard League belong, as separate from the SICULO-NORMAN, TUSCAN, and VENETIAN, schools, will be noticed s. v. LOMBARD-ROMANESQUE.

The consideration due to the sixth subject has been attempted to be given s. v. ITALIAN ARCHITECTURE, which indicates the phases of art in the edifices of Lombardy, whether the ancient or the modern extent of country be understood. As to the later periods of Italian art, it is evident that the mediæval structures of Italy may be divided into more classes than merely those of Romanesque and Gothic; it has therefore been found convenient to describe those which were erected in (modern) Lombardy as LOMBARD-GOTHIC.

With regard to the seventh subject, taking the term "Lombard" in its fullest extent, it is held that when the Longobardi, after removing from the Scandinavia on the lower part of the Elbe to the southern bank of the Danube (from Augsburg to Belgrade), burst 567-8 into Italy, with their allies, the Gepidæ of Dacia, Saxones, and Suevi, besides Bulgarians, Pannonians, Sarmatians, and others, they imported no peculiar style: it is assumed that, being uncivilised, whatever architecture they might have known was a Roman art naturally rather worse than what was then employed by the Italians themselves, and that they did not borrow from the Greeks. It is to be observed that CORDERO, p. 207 and 314, decides that "Romana, è non Longobardica, nè Orientale" was the art of Italy under them till the capture 774 of Pavia. A list of the works which he attributed to the Lombard kings is given s. v. ITALIAN ARCHITECTURE. Remarks on remains belonging to the Lombard period occur in NESBIT, *On the Churches at Rome earlier than the year 1150*, published by the SOCIETY OF ANTIQUARIES, *Archæologia*, 4to., London, 1866, xl, pt. 1, pp. 157-224. It is to be regretted that few notices seem to have been collected, with discrimination, of the remains of the buildings, from Casale to Taranto, which must have been executed throughout Italy under Lombard princes: some examples, especially those at Cividale and Rome, hereafter to be noticed, have been suggested, besides the chapel said to have been founded in the eighth century by the duchess Gertrude at Friuli, which is described by FERGUSON, *History of Arch.*, 8vo., Lond., 1865, ii, p. 174, from illustrations in GALHABARD,

Monumens, 4to., Paris, 1850; but the adoption of them requires care, which must also be exercised in reading D. and G. SACCHI, *Antichità Romantiche d'Italia; Saggio primo intorno all' Architettura Simbolica*, etc., 8vo., Milan, 1828.

Certainly the sculpture in the seventh and eighth centuries was free from the monstrosities which appeared perhaps so early as the ninth century: indeed CORDERO, p. 145, mentions that although Italian ornamental art was tolerably satisfactory from 600 to 1000, yet in one time (the seventh century) the execution of the figure, even so slightly as in basso-relievo, was entirely suspended. This opinion is the reverse of one pronounced by GALLY KNIGHT, viz., "imitation of the Roman bas-reliefs succeeded to the monstrous imagery of the seventh and eighth centuries": his error tinges all his criticism upon the subject; and, unfortunately, was repeated in the *Handbook*, 1842. His mistake led him to consider that the church of S. Tommaso in Limine near Bergamo belongs to the seventh century: he says that "the pillars are stunted and thick, and their capitals exhibit the usual imagery of the Lombards"; whereas CORDERO, p. 170, places it in his list of examples of buildings erected in the twelfth century. The last named author, p. 115, describes the Lombard sculpture as consisting of figures and arabesques, in very flat relief, which are not altogether despicable, and which, although not equal to antique work, are less uncouth and inartistic than the excessively ugly figures of monsters, human beings, and deformed animals, which so frequently debased architecture after the year 1000: in fact, he refuses to see barbarism in times (however poor, or corrupt, or decayed), that produced the buildings erected in Italy during the interval between the choice 330 of Constantinople and the coronation of Charlemagne 800 at Rome. He does not extend that interval to a later period, because (pp. 69 and 316) he sees in works executed under Charlemagne an Oriental spirit that he considers (pp. 43 and 316) was revived on the shores of Istria and in Venice under Otho the Great (936-73) and constituted the first phase of the Romanesque style. But SELVATICO, p. 66, describing the revived sculpture with features and folds that are merely grooves in a surface which is flush above a ground that is slightly sunk, cites some decoration in the seventh and eighth (ninth, CORDERO, p. 101) centuries at Rome and on the church built 991 at Subiaco as similar work: he speaks of this as an "arte Lombardo o Forojuliese" (being Romanesque art with a Greek element), which in his opinion was more likely to have originated in Friuli than in Como; adducing as proofs the sepulchre of Pemo duke of Friuli in the eighth century in the church of S. Martino at Cividale, an octagonal baptistery erected 713-44 in that city, part of the cancellum in the cathedral at Aquileja, the cloister before 881 of the church of S. Ambrogio at Milan, part of the church of S. Tommaso in Limine near Bergamo (twelfth century, CORDERO, p. 90), etc.

Upon the eighth subject it is only necessary to say that the *Handbook*, p. 344, erroneously speaks of churches at Venice erected in "a style which here they term Lombard but which is a revival of the Roman style in the fifteenth century." The passage should read thus:—a style which here they term Lombardesque, being a revival in the fifteenth century, by the Lombardo family, of Roman art.

From the above remarks it would seem fair to conclude that the term 'Lombard architecture' should be applied solely to the works executed in Italy under the Lombard rule over the places where such structures are found; unless the word 'Longobardic' be employed for the style intended to be thus precisely defined.

LOMBARDESQUE STYLE. This term is to be accepted (instead of an erroneous use of the adjective "Lombard") as the translation of the words "lo stile Lombardesco", which abbreviate the following eulogy, upon the architects of the

LOMBARDO family and their disciples, by professor Carlo Promis: "la famiglia dei Lombardi mostrò a Venezia un gusto, una fantasia, una perfezione, un' arte di conciliare i bisogni dell' età colle più squisite bellezze antiche e nuove, da renderli esemplari perpetui del buono, del bello, del guidizioso;" as quoted by SELVATICO, *Sulla architettura*, etc., in *Venezia*, 8vo., Venice, 1847, p. 258, who qualifies that praise by noticing, p. 251, that although nearly all the entrance doorways of the Lombardesque palaces are mean and inelegant, there seems to be no reason for that particular defect. He mentions pp. 208-232, L. Bregno, A. Dentone, A. Leopardi, and A. Scarpagni, as the chief followers of the "scuola Lombardesca"; and adds pp. 213-231, notices of others less important, as Francesco da Castiglione, Marino and Jacopo Citrino, Marco Fiorio, Matteo Fontana, Moreto di Lorenzo, the Augustinian fra Gabriele di S. Stefano, Marco Turi, and a Taddeo, who is called "sommo in quest' arte" by the camaldolese monk Pietro DELFINO. It is worth notice that SELVATICO, p. 504, accepting 1433 as the date given by VASARI for the visit to Venice of M. Michelozzo, says it would certainly not be unreasonable to suppose that architect to have been the author of some of the works noticed *s. v.* Lombardo, as those by unknown architects, and equally that he might have been the first to exhibit that phase of the "risorgimento" in which the Lombardo family was so eminent.

LOMBARD GOTHIC ARCHITECTURE. Three explanations of this term may be given. I. In its most restricted sense it means the style of Pointed Art that was practised in that portion of Italy which, as explained *s. v.* LOMBARD ARCHITECTURE, was called Lombardy till lately; in this case it has been termed in the *Handbook for Travellers in Northern Italy*, 12mo., London, 1846, pref. xxiii, "an exuberant variety of the French and German" Gothic, and is opposed by that guide to the Genoese, Tuscan, Venetian, and other supposed varieties of Pointed art. II. Sometimes it means the Gothic architecture that is found in that portion of Italy which, as explained in the article above cited, obeyed the Lombard League: it thus, in fact, includes all the examples of Pointed art in the north of Italy, in opposition to those erected in the south: the features of Gothic architecture in a large part of Lombardy so understood, supply occasion for most of the remarks in STREET, *Brick and Marble in the Middle Ages*, 8vo., Lond., 1855. In this case it is desirable to remark that critics have not yet ascertained whether the Pointed art (*if any*) of Naples under the House of Hohenstaufen 1194-1268 was German or Lombard; or whether the highly praised Gothic architecture of Naples under the House of Anjou 1268-1435 was native or French or Lombard: the influence of the Tuscan-Gothic school (here taken as part of the mediæval Lombard schools) seems to be too often forgotten. III. The third explanation of the term, founded upon the belief that the Neapolitan princes were served by Lombard artists and their native pupils, renders the term an equivalent for the Pointed architecture of Italy in opposition to that of Sicily. The Gothic architecture of Italy was so exotic and impure that it has been considered desirable to include the examples of Pointed art in Lombardy (whatever extent of region be covered by that word) in the remarks made *s. v.* ITALIAN POINTED ARCHITECTURE.

To those observations it may be useful to add from the *Handbook*, p. 219, that the church of Sta. Agata, at Cremona, exhibits the curious union of apparently early Romanesque capitals with arches belonging to the latest Gothic work; p. 289 that the Dominican church, at Vicenza, has "Romanesque capitals which, though certainly coeval, might be of the tenth century—one of the peculiarities of the Italian styles"; and p. 11 that the church of S. Antonio di Rinvoso, near Rivoli in Piedmont (given in HOPE, *Historical Essay*, 8vo., London, 1840, p. 431, pl. 12) is Gothic, built of moulded brick, "a specimen of a style almost peculiar to Lombardy, of which the traveller will find the full display at Milan, Piacenza, and Pavia."

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LOMBARDIC CHARACTERS. The general, but injudicious, use of these words as expressive of the date of monuments by the name of the style of letter found inscribed upon them, will justify some length in the following remarks. There seems to be great uncertainty as to the time at which the semi-Gothic or round-shaped characters of the Latin alphabet, that are seen in the three inscriptions of the twelfth and thirteenth centuries given in the *Illustrations*, 1867, Part 1, *s. v.* Letter, first received the appellation "Lombardic": this epithet is more improper in their case, for reasons given *s. v.* LOMBARD ARCHITECTURE, than in that of the Norman and other buildings belonging to the Romanesque period.

The historian who invented this name for them, may have supposed that they were obtained from Lombardy in the twelfth century; but the absence of any general acknowledgment of such a presumed basis for the term, (a foundation which the remarks *s. v.* LETTER on the introduction of them in Germany show is unstable) has caused a more serious error, viz., the belief that the so-called Lombardic characters derived the name in consequence of an employment of them by the Lombard (Lombard) successors of the Roman emperors. A remarkable specimen of this mistake seems to have occurred in the *Handbook for Travellers in Northern Italy*, 12mo., London, 1846, p. 9, which states that one early portion of the abbey of S. Michele on Monte Pirichiano is a semi-circular arch of grey marble, "Romanesque in style, and sculptured with the signs of the zodiac and inscriptions in very early Longobardic characters"; whereas CORDERO, *Dell' Italiana Architettura*, 8vo., Brescia, 1829, p. 173, expressly mentions those letters as being "quasi tutti ancora Romani, cioè non tondi o semigotici" and as, therefore, part of his evidence that the fragment was executed about 1135: the same author, p. 228, claims the same shape of letter as belonging to 1145-53. Although, unfortunately, it seems impossible to find in England (as tests of his opinion) either casts or rubbings from inscriptions known to have been executed under the Longobard sovereigns, such as those of Rothar 636-653, Grimoald 662-671, and Aripert 700-712, in the collection of the University at Turin, or those in the museum at Brescia; or those of Luitprand 713-744 in the church of S. Giorgio, a little to the north of Verona; yet the plate of *Illustrations*, *s. v.* Letter, shows that the forms of the letters employed for inscriptions in Italy from the fifth to the eleventh centuries inclusive did not materially differ from those used before the time of Constantine: the Lombard princes 568-772 mixed, with the letters of their Roman predecessors, some Greek shapes, and contracted some syllables: and the later Latin inscriptions in Italy, as in England, did not exhibit the rounded form much before 1150.

The observations made *s. v.* LETTER on the duration of the use of the so-called Longobardic or Lombard alphabet (more justly termed new-gothic majuscule by OTTE, *Handbuch*, 8vo., Leipzig, 1854, p. 240) need not be repeated here: but it may be useful to add to them that the series of English great seals shows the transition from Roman to it, *temp.* Henry II (1154-89) and the predominance of Black-Letter over it, *temp.* Edward III (1327-77). In the interval between those periods occurs the seal of Henry III (1216-72) which is the best of those specimens of so-called Lombardic lettering, and curiously corresponds with the body of the writing in the copy, of the Latin Gospels, supposed to have been presented by the empress Matilda of Germany and her son Otho I to king Athelstan of England 924-940, that is now preserved as the Cottonian MS. Tiberius A 2 in the British Museum, and that may some day be advantageously compared with the list of relics given by Gregory 1590-604 to queen Theodolinda, and with the sacramentary of king Berengarius 888, and with the evangelistarium of archbishop Aripert 1018-45, all preserved at the cathedral of Monza; as well as with the coins of the Longobardic dukes of Benevento, Grimoald 787-806, and Radulgisus 840-41.

LOMBARDINO, IL; see SOLARI (C).

LOMBARDINO (TOMMASO), who arranged in its present form the church of S. Eustorgio at Milan, finished by F. Richini, was probably the T. Rodario of Maroggia employed 1487-1526 on the cathedral at Como. T. di Rodario did the altar of St. Lucia in 1402; LATUADA, *Descrizione di Milano*, 8vo., Milan, 1737-8. 28.

LOMBARDO (CARLO), properly LAMBARDO (C.)

LOMBARDO (CARLO), see MADERNO (C.)

LOMBARDO (ELIA DI BARTOLOMMEO), continued 1488 on a new design the cathedral of Città di Castello, which had been commenced 1457 or 1466 in a Pointed style: but it is said to have been remodelled during 1503-33 upon designs given by Lazzari and Raffaello as his pupil, and to have been finished 1529. VASARI, *Vite*, edit. Florence, 1851, s. v. Lapi.

LOMBARDO (LAMBERT) surnamed Suavius, Suterman, or Susterman, born 1506, at Liège, also a painter, sculptor, and engraver, was the son of Gérard Lombard. He studied under Mabuse, and Schwartz of Munich; travelled into France, thence into Italy under the patronage of cardinal Pole; and returned 1539 to his native city, where his residence created from his designs still exists. He designed 1552 the Flamboyant porch of the north aisle to the church of S. Jacques at Liège; given in WEALE, *Quarterly Papers*, 4to., London, 1844-5, i and ii: and added 1558 the *portail* of the Corinthian order in the *style de la Renaissance*. He is supposed to have designed the stained glass dating 1530-40, now in Lichfield Cathedral, and formerly in the abbey of Herkenrode near Liège. He died in 1560, or at Liège in 1565. LAMPSONIUS, *Vita L. L. pictoris architetti celeberrimi*, 8vo., Bruges, 1665, which has not been seen. A portrait of him is given in LAMPSONIUS, *Pictorum*, 4to., Antwerp (1572), pl. 18. 5. 14. 31. 73. 89. 112.

LOMBARDO (TOFANO), see SOLARI (CRISTOFANO).

LOMBARDO. The family name of many architects employed during the fifteenth and sixteenth centuries at Venice: the absence of tradition and records compelled SELVATICO, *Sulla Architettura*, etc., in *Venezia*, 8vo., Venice, 1847 (who will be followed in the annexed account of several members of that family) to be content with mentioning pp. 232-256, as unappropriated works in the style of the Lombardi the following productions: the campanile of the church of Sta. Maria dell'Orto, CICOGNARA, ii; the campanile, 1480, of the church of S. Pietro di Castello; the entrance to the oratory of S. Giovanni Evangelista, attributed in CICOGNARA, ii, to Tullio and Giulio Antonio; the cappella maggiore, 1462-71, of the church of S. Giobbe; the cappella Gussoni (which he almost decides to be the work of Tullio) in the church of S. Leone; the cappella Cornaro, in the church of the SS. Apostoli, (which he considers may have been executed by Tullio, or by A. Leopardi rather than by G. Bergamasco, who certainly was employed on the tomb therein); the old church of the Jesuats; the front of the church called the Spirito Santo; the palazzi Contarini alle Poste a S. Luca (CICOGNARA, ii), Trevisan in Canonica (given in CICOGNARA, i, and much in the manner of G. Bergamasco), Dario, Manzoni, Contarini a S. Samuele 1504-46 (which rather is Bramantesque), Grimani a S. Polo, and parts of others; the high altar in the church of S. Giovanni in Bragora, an altar in that of Sta. Maria Mater Domini, if not the whole of that church, which is rather Sansovinesque, another in that of SS. Giovanni e Paolo, and four others in the aisles of that of S. Zaccaria; and the following monuments, Jacopo Marcello, Maffeo Zeno (and his mother Generosa Orsini), Melchiorre Trevisan, Pasqualigo, Benedetto Brugnolo, and Pietro Bernardo, in Sta. Maria de' Frari; Dandolo in S. Pantino; Sanudo in S. Zaccaria; Suriano in S. Stefano; Matteo Giustiiani, Bartolommeo Bragadino, Michele Steno, Giovanni Battista Boncio, Girolamo Canale, Nicolò Marcello, and the doge Pasquale Malipiero (1462), in SS. Giovanni e Paolo; the chimney pieces in the camera degli Scarlatti (CICOGNARA, i, with some others,

in the ducal palace; and the entrance of the arsenal. To these he adds p. 437, the interior of the church of S. Canciano. The names of the artists amongst whom a distribution of these works might be made, is given s. v. LOMBARDESQUE STYLE, with a note respecting M. MICHELOZZO.

LOMBARDO (PIETRO), the earliest of these sculptor architects of the name, was a son of the Venetian mason Martino. His first works in his native city seem to have been the altars of S. Giacomo and S. Paolo 1462-71 in the basilica of S. Marco; the assumption that they were by him arises from the similarity of their ornamentation to that of the presbytery of the church of Sta. Maria de' Miracoli.

In Treviso he is reputed to have made the lion for the porta di S. Tommaso, according to CADORIN, *Pareri*, 8vo., Venice, 1838; who gives an account p. 140-5 of the life of this artist, which deserves attention, and does not appear to doubt either that Pietro there reformed and enlarged 1474 the duomo, and, with his sons Tullio and Antonio, sculptured some saints; or that two lions in the cappella degli Apostoli in the church of S. Nicolò were his work, as well as the design of the monument to Agostino Onigo.

He then seems to have returned to Venice: CICOGNARA, i, attributes to him the erection of the palazzo Loredano-Vendramin-Calergi built 1481, bought 1681 by the duke of Brunswick, who sold it to the duke of Mantua, and afterwards in the possession of the duchesse de Berry: it could not have been by Sante, to whom it has been ascribed, as will be seen in the account of that artist: SELVATICO, although suggesting that it might have been by Martino, is inclined to consider it as the work of Pietro; but this author, after noticing that the resemblance between the building in question and the palazzo Corner-Spinelli a S. Angelo (given in CICOGNARA, i, as by Pietro and Tullio) almost obliges him to assign them to one hand, intimates that the latter edifice (which has been assigned by other writers to some Lombardo) might have been by G. Bergamasco.

There seems to be no doubt that the great columns, carrying the statue of S. Apollinare and the figure of the Venetian lion, in the great *place* at Ravenna, were executed by Pietro; in that city he designed 1482 the tomb to Dante with its chapel in the church of S. Francesco.

Being again at Venice, the construction of the church of Sta. Maria de' Miracoli, upon a design (the architect's name is lost) chosen in competition 1481, was confided to Pietro, who was employed 1484 to add the cappella del santuario which had not been comprised in the original plan, and he made it much richer than the main building: these works, completed 1489, as given in CICOGNARA, ii, afford examples of almost pure Grecian ornament, with some of Roman style, and more which truly belongs to the quattro-centist artists. The monument 1476-88 to the doge Pietro Mocenigo (ob. 1476) in the church of SS. Giovanni e Paolo is said to have been executed by him with the help of his sons Tullio and Antonio. His (undated) church of S. Andrea in the Isola della Certosa, usually called S. Andrea alla Certosa, was destroyed 1797 1814.

The statement that Pietro erected at Padua a cloister in the monastery of Sta. Giustina, is due to CADORIN, p. 141, whose notice that it was painted by il Zelotti may tend to identify the cloister in question.

The date 1466, for the construction of the Torre dell'Orologio to the basilica of S. Marco at Venice, supplied SELVATICO with reason for doubting that Pietro was engaged upon the Torre itself (struck by lightning 1750 and restored by A. Camerata, or 1755 by B. Ferracino, or 1757 by G. Camerata): on the other hand the date 1496 given by CICOGNARA, ii (1494 and 1499 by other writers), brings his employment upon it within the range of probability, especially as that work would naturally have tended to the temporary employment of Pietro by the government when A. Riccio fled from Venice: it is certain that Pietro had acted for some months in his stead, before being appointed 14 March 1499 his successor as archi-

teet to the ducal palace with a salary of one hundred and twenty ducats: the document is printed by CADORIN, p. 143.

The contract 9 May 1502 by Pietro to rebuild, after its fall 1457 the cathedral at Cividale del Friuli is given in MANIAGO, *Storia*, 8vo., Udine, 1833, pp. 152 and 388; where he notices that the chief portal of the previous church was retained with other portions of old work in the new edifice: and that the citizens were consoled for the failure of B. della Cisterna by the talents of Pietro.

For twelve years 1499-1511 he superintended the works executed for the government in Venice at the ducal palace and elsewhere, including the pavement of the *pescheria* or fish-market, and, after 1505 according to SELVATICO, p. 196, the wings of the Torre dell' Orologio, which are said to have been completed 1510-15 by B. Buono, but eight columns were added 1755 by TEMANZA. It is uncertain that he did anything to the ducal palace more than the leaden covering to the Avogaria del Comune and the sala del Consiglio de' Dieci; but SELVATICO, p. 197, insists that, as the internal small façade which corresponds to the flank of the basilica was executed soon after 1501, it would properly be supposed to be designed by Pietro rather than by G. Bergamasco to whom it is ascribed by CICOGNARA, and p. 172 that, as two stories of the Procuratie Vecchie were in existence before 1517, they are more properly attributable to Pietro than to the second Bartolommeo Buono, who in that year (CADORIN), perhaps from the old age of Pietro, was appointed to superintend the completion of that structure with a third story and parapet and sculpture by G. Bergamasco, a view which is expressed more fully with the date 1500 in CICOGNARA, i.

In the notice of Pietro and Tullio given by FEDERICI, *Memorie Trevigiane sulle Opere di disegno*, 4to., Venice, 1803, i, 230-5, and ii, 19, 21, 23-5, 28-9, mention is made of their works at Treviso, including the palazzi Bressa (also called Bettignoli a S. Stefano) and de' Conti Pola in the piazza de' Cerchi; the porta di S. Tommaso, which he finally ascribes entirely to Tullio; the porta di SS. Quaranta Martiri, which is more probably the one that ought to be assigned to Tullio 1509-16; and the cappella dell' Annunziata, in the cathedral, which he says is due either to Pietro or to Tullio, and seems to be the enlargement by Pietro mentioned by CADORIN.

The interior of the church of S. Salvatore at Venice is ascribed to him, instead of Tullio, erroneously in the *Handbook*. The church of S. Cristoforo di Murano at Venice, which was destroyed when the present cemetery of that city was made, is assigned to Pietro by SELVATICO, who doubts the usual statement that he either designed or superintended the work of the cappella Zeno at one end of the narthex of the basilica of S. Marco, mentioned in the account of the life of Antonio, where also is a note upon the interference by Pietro in the works of the scuola della Misericordia 1507-15.

It is asserted by CADORIN, p. 144, and by SELVATICO, that after 1511 the name of Pietro does not appear to be noticed: the preceding dates would show that he must then have attained about 85 years of age at the least: but it is said that he was elected 1514 president of the collegio dei Scarpellini his guild, and that in the following year he procured the erection of a new building for its meetings: and CICOGNARA, ii, ascribes to Pietro the water façade of the scuola di S. Rocco, which edifice is sometimes attributed to him, as well as to S. Serlio, as will be seen in the account of the life of Sante. Furthermore the Fondaco dei Tedeschi, that was burnt in February 1504, (not 1505-6), is said by TEMANZA, i, 90, to have been rebuilt by Pietro with his sons Tullio and Antonio: but Pietro could have done little, if anything, beyond repairing it; inasmuch as SELVATICO, p. 166, notices that the design by (not Giocondo 1508 but) Girolamo Tudesco for rebuilding it was approved 19 June 1519. The commencement of the church of Sta. Maria Mater Domini is ascribed in one passage to Pietro, in another to one of the family, by TEMANZA, attributing the completion

of it to J. Sansovino, whose claim to the whole design is allowed by SELVATICO in the account pp. 185-198 of Pietro and his performances, wherein NAGLER states that he died 1515. Nothing is said of him in connection with the interior (not completed until 1430), or the portal cir. 1490, of the church of SS. Giovanni e Paolo commonly called S. Zanipolo, the whole of which building, although known to have been incomplete 1395, has been attributed to Pietro. 12. 26. 28. 68. 112.

LOMBARDO (ANTONIO), probably born before 1453, was a son of Pietro, whom he assisted at Treviso in the cathedral, and at Venice in the church of Sta. Maria dei Miracoli as well as in the Pietro Mocenigo monument (1476-88) in the church of SS. Giovanni e Paolo. The monument to cardinal Zeno, with the altar of the cappella Zeno, in the narthex of the basilica of S. Marco was originally entrusted to A. Leopardo and Antonio; but after a long quarrel the former was dismissed 1505; and, rather later, the slow progress made by the latter even with the help of Pier Zuane dalle Campane who cast the statue of the Madonna della Scarpa for the altar, Zuane Alberghetto, and Paolo Savii, caused the superintendence of the work to be transferred to Pietro; SELVATICO, pp. 190 and 202, repudiating the work for the Lombardo family, suggests that Pietro did not interfere as an artist, but merely pushed the work to completion 1515, that date being correctly given in CICOGNARA, i. It is stated that Antonio (Pietro, in SELVATICO, p. 219 and 281) also superseded A. Leopardo, who had designed 1507-8 the Scuola della Misericordia, in the execution 1515 of that edifice. Any assistance given by Antonio to his father in rebuilding the Fondaco dei Tedeschi is problematical. It would seem that in the cappella del Santo in the church of S. Antonio at Padua, where one bas relief is inscribed with the name of this artist, Tullio and Giulio were also employed. SELVATICO, pp. 185, 192, 201, 219. 3. 25. 68. 112.

LOMBARDO (GIULIO), who is assumed to have been a son of Pietro, was the father of Sante. The earliest notice of him seems to be in CICOGNARA, ii, who thinks that the portal 1481 of the church of S. Giovanni Evangelista at Venice might be attributed to Tullio and Giulio. In that city he was to advise Sante in the works 1524-7 of the Scuola di S. Rocco. He is said to have been employed with Tullio and Antonio in the cappella del Santo in the church of S. Antonio at Padua; and, with Sante, to have assisted Tullio in the works at the church of S. Salvatore at Venice, and in the church of the Madonna grande at Treviso. 68. 112.

LOMBARDO (LODOVICO). This name is attached to the view of the palazzo Grimani a S. Polo on the grand canal at Venice, in CARLEVARI, *Fabbriche*, fol., Venice, 1703, pl. 81, which must have been overlooked by SELVATICO, p. 252, who was inclined to ascribe it to Martino.

LOMBARDO (MARTINO) was the architect of the scuola di S. Marco, after 1485 according to CICOGNARA, ii, at Venice, where he was assisted by Moro, and in the sculpture by Tullio; SELVATICO, p. 199. The influence of Francesco Colonna on the design is merely a conjecture hazarded in the *Handbook*. The similarity of style in that building and in the church (1456-1515 of S. Zaccaria given in CICOGNARA, ii, in the same city, is the reason offered by TEMANZA for attributing the whole of the latter edifice to Martino; but its interior is considered to be the work of an earlier architect (Antonio di Marco was "proto" of the church 1477) by SELVATICO, p. 200, who is inclined to ascribe to Martino the palazzi Grimani a S. Polo (now known as a work by Lodovico), Loredano-Vendramin-Calergi, and (*Illustrations*, 1851, pl. 58) Corner-Spinelli, if the two latter are not by Pietro, or perhaps even by G. Bergamasco. There is a bust of Brocardo Malchiostro by him in the cappella dell' Annunziata of the duomo at Treviso. 12. 28. 68. 112.

LOMBARDO (MATTEO), as the architect of the church of S. Zaccaria, is probably an error in the *Handbook* for MARTINO.

LOMBARDO (MORO), apparently a son of Martino, was engaged under him upon the scuola di S. Marco at Venice.

He is said by SANSOVINO to have designed, in that city, with Sebastiano da Lugano the church of S. Giovanni Grisostomo, which has also been attributed to Tullio: but SELVATICO, p. 202, assigns the general design to this Sebastiano, and the campanile with the side chapels of the transept to Moro. The *Letters* of the Camaldolese monk Pietro DELFINO state that the works of the church 1466-78 of his monastery of S. Michiele di Murano (near that of S. Giovanni Grisostomo) were conducted by a Moretto "lapicida cupidissimus perficiendæ fabricæ", and "fabricæ præfectus" whom SELVATICO, p. 202, considers to have been this Moro. 28. 68.

LOMBARDO (SANTE), born 1504, was a son of Giulio, and appears to have commenced his career with an appointment 20 March 1524 at an annual salary of fifty-four ducats as successor to B. Buono (who was probably the original architect, as he had presided over the work from 11 January 1517) in the superintendence of the erection of the scuola di S. Rocco: he was to be aided by his father; and Tullio assisted in the decoration: but Sante, probably being too young, was himself superseded 1527 by A. Scarpagni, who completed c. 1537 the front, if not the whole edifice, yet it seems that Sansovino was later employed on it; and Serlio as well as Pietro have been credited with it: CICOGNARA, ii, gives the side to the piazza as by A. Scarpagni, the side to the canal as by Pietro, the staircase 1517, and the porta dell' Albergo 1547. With his father he was engaged on the completion of the work by Tullio about 1530 to the church of the Madonna grande at Treviso. He also is said to have continued the works begun by Tullio in the monastery of S. Salvatore, and to have been employed with his father Giulio under Tullio in the erection of its church. It has lately been discovered by professor Giovanni Veludo, in documents belonging to the church of S. Giorgio de' Greci, that this building, usually ascribed to J. (Tatti) Sansovino, was entirely the work of Sante and of an architect named Chiona; and it is assigned to Sante with the date 1552 in CICOGNARA, ii. The palazzo Loredano-Vendramin-Calergi, inscribed "Non nobis Domine", and situated on the grand canal near the church usually called Sta. Marcuola but dedicated to SS. Ermenegora e Fortunato, is ascribed to him in RUSKIN, *Stones of Venice*, 8vo., Lond., 1853, iii, 310, printing the statement by Mr. Rawdon Brown that "SELVA found proof in the Vendramin archives that it was commenced by Sante Lombardo A.D. 1481"; whereas in CICOGNARA, *Fabbriche*, fol., Venice, 1815-20, i, 128, the discovery of the date of construction is recorded as irreconcilable with the period of birth known to TEMANZA, who was the person that attributed to Sante this edifice (which has one wing by Scamozzi) as well as the palazzo Corner-Spinelli; both buildings may be ascribed to Martino or to Pietro or even to G. Bergamasco. The palazzo Gradenigo a S. Samuele (supposed to be destroyed) and the palazzo Trevisan a Sta. Maria Formosa, given in CICOGNARA, ii, are also assigned by TEMANZA to Sante, who died 16 May 1560 at the age of 56 years according to the necrology of the parish of S. Samuele. SELVATICO, pp. 193, 205-8, 210, 208. 25. 26. 28. 68. 112.

LOMBARDO (TULLIO), probably born before 1453, was a son of Pietro, and was the best sculptor in the family, as will be seen by the mention of him in connection with the works by other members of it. He was the chief assistant to his father in the erection of the cappella maggiore cir. 1474 in the cathedral at Treviso: and they are credited by CICOGNARA, i, with the design of the palazzo Corner-Spinelli a S. Angelo at Venice. In that city he is supposed to have similarly helped in the erection of the church of Sta. Maria de' Miracoli; is said to have worked with Antonio for his father on the monument to Pietro Mocenigo (ob. 1476) finished 1488 in the church of SS. Giovanni e Paolo, in which edifice Tullio executed the monument to Giovanni Mocenigo (ob. 1485), and worked on the decoration (especially of the soffits) of the scuola di S. Marco with Martino and Moro, as well as on the scuola di S.

Rocco with Sante. He assisted A. Leopardi in that glory of Venetian art of the Lombardesque school, the Vendramin tomb (moved from the chiesa de' Servi into the church of SS. Giovanni e Paolo), from which his statues of Adam and Eve have been taken to the palazzo Vendramin Calergi.

According to ROSSETTI, *Padua*, 12mo., Padua, 1780, p. 359, the archives of the Benedictine casinate monastery at Praglia, between that city and Teolo, show that its church was commenced 1490 upon a design by Tullio.

The cathedral built about 1500 at Belluno is ascribed by some writers to him, but by TSCHISCHKA to Palladio (1518-80).

Among his later engagements at Venice, he altered the tribune erected as the commencement by G. Spavento of the church of S. Salvatore, and designed the interior (by Pietro and altered by Scamozzi, in error in the *Handbook*) of the edifice (this only is given in CICOGNARA, i, as the façade attributed to B. Longhena by TSCHISCHKA, was added by G. Sardi) as well as the cloister: the works of the monastery are said to have been finished by Sante who, with his father Giulio, was engaged in the execution of the church. This Tullio is incorrectly stated to have designed the church of S. Giovanni Grisostomo, which was the work partly of S. da Lugano, partly of Moro: but SELVATICO almost decides upon giving to him the credit of the cappella Gassoni in the church of S. Leone called S. Lio; and thinks that the cappella Cornaro in the chiesa de' Apostoli was either by Tullio, or by A. Leopardi, rather than by G. Bergamasco. To the latter, with Tullio, the *Handbook* ascribes the large western window, 1523-38, at the south-west corner of the ducal palace. The portal 1481 of the church of S. Giovanni Evangelista is given in CICOGNARA, ii, who thinks that it might be attributed to Tullio and Giulio. Any assistance given by Tullio to his father in rebuilding the Fondaco dei Tedeschi is problematical.

He was a second time engaged at Treviso, where he is reputed to have built the cappella del Sacramento in the cathedral, the transept (if not the whole edifice) of the church of the Madonna delle Grazie or Madonna grande, completed about 1530 with the help of his kinsmen Giulio and Sante; and three chapels, with the organ, in the church of S. Polo: to these must be added that FEDERICI, *Memorie Trevigiane sulle Opere di disegno*, 4to., Venice, 1803, i, 230-5, and ii, 19, 21, 25, 28-9, besides mentioning the works in which he assisted Pietro, gives to Tullio the sole credit of the monument to Mercurio Bua (ob. 1529) in the church called Madonna Grande, and the porta di S. Tommaso; this author seems to have erred as regards the latter work, which should rather be the porta di SS. Quaranta Martiri.

Among his sculpture, mention is made of his work with Antonio and Giulio in the cappella del Santo in the church of S. Antonio at Padua. According to TSCHISCHKA he died 1537 at Venice: this seems more probable than 1559, as given by other authors, because, if he died in the former year, the preceding dates would show that he must, even then, have attained about 85 years of age. SELVATICO, pp. 170, 192, 202-5, 236-7, 526. 3. 25. 68. 112.

LOMBARDO-SARACENIC ARCHITECTURE. This term appears in the *Handbook for Travellers in Southern Italy*, 12mo., London, 1853, pref. lx, as the style which resulted when the Normans, after their conquest of Sicily, engrafted upon the Lombard architecture, which that book calls "a combination of Roman and Byzantine" the Saracenic style; thus "producing that singular mixture which is now known as Lombardo-Saracenic or Romanesque." This subject will be noticed s. v. SICULO-NORMAN ARCHITECTURE.

LOMBARD-ROMANESQUE. As stated in the fifth section, s. v. LOMBARD ARCHITECTURE, the present subject embraces the buildings in the districts of the Lombard League enumerated in the second definition of the word 'Lombardy' given in that article, so far as those structures belong to the period between the extinction of Roman, and the appearance of

Pointed, art in Italy or even later. That interval has been found susceptible of division, by CORDERO, *Della Italiana Architettura*, 8vo., Brescia, 1829, p. 95 and 316, who acknowledges the orientalism introduced 774-1000 into the debased Roman art of Italy, for one portion of his "gottico-anteriore", and the complete expansion 1000-1250 of the mixed styles as one form of architecture, for the other part. A somewhat similar division is made by SELVATICO, *Sulla Architettura*, etc., 8vo., Venice, 1847, p. 59, who wishes to make the first period commence earlier, in order to enable him to trace its origin in Cividale del Friuli, and to have a right to call it the *stile forojuliese*, reserving the term *architettura* or *maniera lombarda*, or *stile lombardo*, for that later portion which he says p. 71 is named the *stile romanzo* (i. e. Romanesque) by German and French writers. The existence of a Tuscan and a Venetian Romanesque more Byzantine than that of the other Italian schools is mentioned by CORDERO, pp. 131 and 167; while the claim of Sicily to a fourth branch of Italian Romanesque is noticed by SELVATICO, p. 72: also a school of Lucca is noticed by RAMÉZ, *Hist. Gen.*, 12mo., Paris, 1843, ii, 417. The points in which the Lombard school differs from the others are seldom mentioned with distinctness; the following collection of them from HOPE, *Historical Essay*, 8vo., Lond., 1840, pp. 227-282, is open to correction and amplification: the numbers given refer to the plates in the second volume of that work.

The trabeation, instead of arcuation, at part of the east end of the cathedral 1106, HOPE (pl. 14) but more markedly in the five lower stories of the baptistery 1196-1281 (pl. 7) at Parma is remarkable, because columns, in Romanesque architecture, rarely support a continuous architrave: still less frequently do these columns support archivolt with other columns immediately resting upon their capitals without any intermediate architrave or string course; such is the case in the front of the church of Sta. Maria della Piazza (pl. 10) at Aucona; if this town may be included, as by SELVATICO, p. 71, (perhaps as having been a republic until 1532) in the list of places exhibiting the style here considered: in the fourth story of that façade may be seen on a small scale the odd effect of the canopy of the portal of the cathedral of S. Ciriaco (pl. 12) in the same city; which is caused by the coping to the gable being returned downwards (without a positive break) to the block over the capital that serves as the impost of the arch under the gable. An external string course at every floor is so common in Romanesque work that the absence of any such band is an exceptional case; as in the apse of the cathedral (pl. 39) at Verona, if indeed this portion be not much older than the reconsecration 1187 of the main building. These string-courses, horizontal or sloping, commonly surmount a scalloped fringe of small arches which gives them a very peculiar appearance; although, in general, they offer little ornament, except in the corbels, yet in the church of S. Zenone (pl. 6) at Verona, as well as in the cathedral at Parma, they are greatly enriched; at first the scalloped fringe had solid spandrels, but it is seen with intersecting moldings forming pointed arches in all the later edifices of the style in Lombardy. There is something quaint in the four slender twisted pillars, rising unbroken from the ground to the cornice, which divide the bands of sculpture that pass between them across the front of the church of S. Michele (pl. 32) at Pavia (assigned by CORDERO, p. 46, to the end of the eleventh century): such bands are seen on the front of the cathedral (pl. 27) at Verona, as well as on that of S. Zenone in the same city. Single round-headed windows with small pillars and arches, all framed in broad flat borders of arabesque work occur in the tower (pl. 66) and church of S. Abbondio (also called S. Carpofero) which, before 1396, was the cathedral at Como: another example may be found in the east end of the cathedral (pl. 60) consecrated 1132 at Piacenza. The small galleries ascending the gable are entirely confined to Lombardy. The apse of the church of S.

Fermo (probably 1313-32) at Verona, is the only example in Northern Italy, that has been cited by HOPE, of the small gable ends which are frequent in Germany: the west front of this church (pl. 37) deserves notice for its round-headed portal with arch moldings that descend unbroken to the bottom; like the window to the upper story of the palazzo pubblico (pl. 24) at Piacenza. The last named building exhibits a curious mixture of the use of pointed and round arches, which occurs also on a façade in the piazza del Archivio (pl. 56) at Milan: and very remarkable are the pieces of crocketing introduced in the Augustinian church (pl. 50) at Pavia, as also at the church of S. Zenone at Verona. The forked cops of the battlements in some districts, as Brescia, Cremona, Ferrara, Florence, Mantua, Monza, Piacenza, and Verona, are so unusual elsewhere as to deserve notice, if they are really older than the fourteenth century and are not, properly, Pointed art.

The employment of stone, brick with stone, and brick, is noticed in HOPE, p. 262, whose observations, p. 256-8, on the allegorical and other additions to Lombard architecture deserve careful perusal. The general absence of lions or other monsters in the porches of the churches at Venice, although these animals are so common to those in Lombardy, as at the cathedrals of Bergamo, Ferrara, Parma, Piacenza, Mantua, Modena, Verona, etc., serves as a proof to SELVATICO of the slight hold which the *maniera lombarda* obtained in that city: the same author's assertion, p. 65, that the employment of monsters in the ninth century in the cathedral at Verona is the earliest instance known to him (if his date be not too early) corrects an error made by GALLY KNIGHT, as mentioned in the seventh subject treated s. v. LOMBARD ARCHITECTURE. For an opinion on the merit of the sculpture in the middle period of the existence of Lombard-Romanesque art, reference may be made to STREET, *Brick and Marble of the Middle Ages*, 8vo., London, 1855, who says p. 265, that when carving "is introduced elsewhere than in the capitals of the columns, it is always very flat and delicate, with little if any relief, severe and strict in its outline, and firm and true in its direct imitation of nature: this, however, is seen only in the very best examples, and even then I am bound to say hardly ever so nobly as in the best Lombard work; for I have seen nowhere in Italy capitals so noble as those in S. Mark's and elsewhere of the earliest kind, or as the flat carving round the arches in S. Zenone at Verona, figured in plate 13, which is of a kind met with elsewhere of the same period, i. e. about 1138-78": the word 'Lombard' seems to be used there, and in pp. 21, 66, 97, 102, and 263 of that book, as equivalent to 'round arched' work.

It might be supposed that Pointed art supplanted the Romanesque feeling in Lombardy as it did in other countries; but this was not quite the case: the round-arched style remained until the *risorgimento*: thus the author last cited mentions, p. 221, the Lombard-Romanesque character of the cloister to the atrium (generally allowed to have been completed 868-881) of the church of S. Ambrogio at Milan; as well as of the choir to the cathedral (not earlier than 1342) at Cremona; and of the "kind of mixture of Lombard-Romanesque features with some Pointed, and no slight dash of Renaissance spirit" seen by him in the front commenced 1473 to the Certosa near Pavia.

LOMENTUM. A pale blue pigment used by the ancients who made it by pounding and washing the earth which was the basis of their CÆRULEUM or azure.

LOMPSTONE. A term used cir. 1412 for a stone of a coarse kind, probably rubble, used in building a wall; *SUUTTES SOCIETY, York Fabric Rolls*, 8vo., Durham, 1859, p. 200, 346.

LONATE (ANTONIO DA), is mentioned under the date 19 May 1519 on the works at Milan cathedral. 27.

LONATI (DOMENICO), is mentioned cir. 1560 on the works at Milan cathedral; he worked there with M. Bassi and F. Mangoni. 27. 68.

LONDON (Lat. Londinium; Augusta Trinobantium; late Lat. Londoniæ; It. Londra; Fr. and Sp. Londres; Dutch Londen). The capital of the united kingdom of Great Britain and Ireland. The city (properly so called) of London, probably extended in Roman times from S. Paul's to Aldgate, and from London-wall to the river Thames: it now reaches to Temple-bar, Middlesex-street, and the Charterhouse; Southwark being only a nominal addition; it is said to contain 434 acres; but in a *Report* made by the city engineer and surveyor 1866; it is stated that "the area of the city within the municipal limits is 631 acres, or nearly one square mile; according to the divisions of the superintendent registrar of births and deaths, the area is 725 acres; deducting the water 67, there remains of land 658 acres, which is 27 acres in excess of the true area." London is also the popular appellation of an area, closely filled with buildings, which is of an elliptical shape, about 9 miles in length from west to east, and 5 miles long from north to south, or about 22 miles in circumference, and contains about 35 square miles: the limits of that London, however, as defined by statute for parliamentary purposes, is a circle having a radius of 3 miles from the general post office, which gives an area of about 19 square miles. As London is also called the METROPOLIS, it should be mentioned that The space under the power of the Metropolitan Board of Works includes on the west Putney, on the east Stratford, on the north Hampstead and Tottenham, and on the south Sydenham. The area of the metropolis, as stated in the report on 1868 by the registrar-general is 77,997 square acres or about 122 square miles.

The following list, No. 1, prepared for the first time, gives the names of architects deceased prior to Lady-day 1869, who have been engaged on works of public utility since the middle of the sixteenth century in the largest area above mentioned: those to whose names the mark * is attached have died since the publication of this *Dictionary* reached the alphabetical places in which biographical notices of them would have been inserted.

LIST No. 1.—ARCHITECTS.

| | | | |
|-------------------|----------------|----------------|-----------------|
| R. Abraham | K. Couse | R. Jebb* | W. Robinson |
| J. Adam | J. Crane* | R. Jerman | T. Rogers |
| R. Adam | J. Crunden | J. Johnson | D. Roper |
| W. Adam | L. Cubitt | I. Jones | G. Sampson |
| E. Aikin | T. Cundy* | R. Jupp | T. Sandby |
| G. Aitchison* | G. Dance, sen. | W. Jupp | J. Sanders |
| D. Alexander | G. Dance, jun. | J. Kay | G. Saunders |
| T. Allison | J. Davies* | S. Kemphorne | J. Savage |
| T. Allison, jun.* | L. Dowbiggin | W. Kent | J. J. Scoles |
| G. Allen | F. Edwards | C. Labelye | — Shepherd |
| S. Angell* | H. L. Elmes | D. Laing | Sir R. Smirke |
| T. Archer | H. Flitcroft | Sir J. Leach | G. Smith |
| A. Ashpitel* | C. Fowler* | S. Leadbetter | Sir J. Soane |
| W. H. Ashpitel | J. M. Gandy | J. Leoni | J. Spiller |
| W. Atkinson | P. J. Gandy | T. Leverton | N. Stone |
| Sir C. Barry* | J. Gibbs | J. Lewis | J. Stuart |
| A. Bartholomew | J. Gibson | T. Little | G. Tappin |
| G. Bassei | J. Gold | G. Maddox | Sir R. Taylor |
| C. Beazley | J. Goldicutt | B. Mainwaring | J. Thorpe |
| S. Beazley | W. Grellier | J. Marquand | W. Tyler |
| F. Bedford* | G. Gwilt | W. Mountague | Sir J. Vanbrugh |
| J. L. Bond | J. Gwilt | R. Mynne | J. Vardy |
| J. Bonomi | T. Hardwick | J. Nash | J. Wallen |
| R. Boyle, earl of | N. Hawksmores | N. Niselsky | I. Ware |
| Burlington | Heindrickx | G. da Padua | S. Ware |
| M. Brettingham | R. Holbein | J. Paine | J. Walters |
| R. F. Brettingham | T. Holden | J. B. Papworth | J. Webb |
| W. M. Brooks | H. Holland | W. Pilkington | J. W. Wild |
| J. B. Bunning* | C. Hollis | J. Plaw | W. Wilkins |
| R. Cabanel | R. Houke | J. Price | W. Winde |
| C. Campbell | T. Hopper | A. W. N. Pugin | J. Woods |
| R. C. Carpenter | — Horne | C. Reeves | Sir C. Wren |
| T. Cartwright | W. Hosking | J. Rennie | B. Wyatt |
| Sir W. Chambers | C. F. Inwood | Sir J. Rennie | J. Wyatt |
| C. G. Clibber | H. W. Inwood | G. S. Repton | P. Wyatt |
| C. R. Cockerell* | J. James | T. Ripley | S. Wyatt |
| S. P. Cockerell | B. Jansen | P. F. Robinson | J. Yenn |

It has been considered undesirable to devote to this metropolis the great number of pages required by a detailed account on the system prescribed for this *Dictionary* in regard of other cities: because the facts are easily found by means of the preceding list supplemented by the following titles of histories, maps, descriptions and engravings, which supply an ample index, to the sources of general or particular information not usually given in *Encyclopædias* and *Gazetteers*. It is to be regretted that few publications to form list No. 6, of a strictly architectural character, have been issued.

LIST No. 2.—HISTORIES, ETC.

STOW, *Survey*, fol., 1633: HATTON, *New View*, 2 vols., 8vo., 1708: STOW, edited by STRYPE, *Survey*, 2 vols., fol., 1720: MAITLAND, edited by ENTICK, *History*, 2 vols., fol., 1756: DUNDLEY, *L. and its Environs described*, 6 vols., 8vo., 1761: GWYN, *L. and Westmr. Improved*, 4to., 1766: MALCOLM, *Lond. Redivivum*, 4to., 1802-7: HUGHSON, *L. and its Environs*, 8vo., 1806: LOCKIE, *Topography of the Squares*, etc., 8vo., 1810: PENNANT, *Account*, 8vo., 1813: HUGHSON, *L. and Westmr.*, 2 vols., 12mo., 1817: ALLEN, *L. and Westmr.*, 8vo., 1823: ELMES, *Topographical Dict.*, 8vo., 1831: KNIGHT, *L., Past and Present State*, 8vo., 1844: CUNNINGHAM, *Handbook, Past and Present*, 8vo., 1849; 2nd edit. 1850: WEALE, *Pictorial Handbook to L. and its Vicinity*, 8vo., 1851; (edit. Bohn, 1854): MACKESON, *Guide to the Churches*, 8vo., 1867.

A good list of maps, prints, and drawings of London and its edifices, etc., will be found in the *Catalogue*, fol., 1829, of the king's library in the British Museum. An illustrated PENNANT by Crowle, is in the print room of the same institution: a smaller work of a similar nature is in Sir John Soane's museum.

LIST No. 3.—MAPS AND PLANS.

AGGAS, *Plan of London in 1560*, engr. by Vertue, 8 sheets, 1737: FAITHORNE, *Map*, 5 sheets, 1658, engr. by Jarman, 1857: BOWLES, *Plan as in queen Elizabeth's days, with the South prospect after the Fire of 1666*: LEAKE, *Exact survey of the City after the Fire*, reduced by J. LEAKE; republ. by VERTUE, 1723: OGILBY, *Plan in 8 sheets, Additions by R. MORDEN and P. LEA, with further additions by JEFFERYS*, 18 sheets, 1732: ROCQUE and PINE, *Plan of London and Westmr.*, 24 sheets, 1746; *New Survey*, 16 sheets, 1751: HORWOOD, *Plan of London and Westmr., showing every house*, 32 sheets, 1799; 2nd edit. by FADEN, in 40 sheets, 1807: SOCIETY for the DIFFUSION of USEFUL KNOWLEDGE, *Map*, 3 sheets, 1844, Nos. 185-6-7: MYLNE, *Geology and Contours of L. and its Environs*, area 176 square miles, 1856: STANFORD, *Library Map of London and its Suburbs*, 24 sheets, 1863: *The Ordnance Survey*, to the 12 inch, and 60 inch, scales.

LIST No. 4.—BOOKS OF VIEWS.

STORER and GREIG, *Select Views, and Environs*, 4to., 1804: ACKERMANN, *Microcosm*, 3 vols., 4to., 1811: PAPWORTH, *Select Views*, 8vo., 1816: WILKINSON, *Lond. Illustrata*, 4to., 1819: CLARKE, *Architectura Ecclesiastica*, fol., 1820: SHEPHERD and ELMES, *L. in the Nineteenth Century*, 4to., 1827-30: COOKE, *Views in L. and its Vicinity*, fol., 1834: OLLIER and BOYS, *Original Views*, fol., 1842: BICKNELL, *Payne's Illustrated L.*, 2 vols., 8vo., 1846-7: GASPEY, *Tallis's Illustrated L.*, 2 vols., 8vo., 1851.

LIST No. 5.—ACCOUNTS OF BUILDINGS.

SMITH, *Illust. of the Antiq. of L.*, fol., 1791: NICHOLLS, *Public Buildings in L. and W.*, fol., 1790: MALTON, *Pict. Tour through L. and Westmr.*, fol., 1792.

PYNE, *Royal Residences*, 4to., 1819: SMITH, *Old palace of Westmr.*, etc., 4to., 1807: BRAYLEY and HERBERT, *Lambeth Palace*, 4to., 1805: ALLEN, *Lambeth Palace*, 8vo., 1826.

DUGDALE, *S. Paul's Cathedral*, fol., 1688; edit. by MAYNARD, fol., 1716: AIKIN, *S. Paul's Cathedral*, 4to., 1813: CRULL, *Antiq. of S. Peter's, Westmr.*, 8vo., 1722: DART,

Westminster Abbey, fol., 1723: ACKERMANN, *Westmr. Abbey*, 4to., 1812: NEALE and BRAYLEY, *Westmr. Abbey*, 4to., 1818-23: SCOTT, *Gleanings from Westminster Abbey*, 8vo., 1861: PEARSON, *Views of Churches*, 1810-12: GODWIN, BRITTON and LE KEUX, *Churches in the City*, 8vo., 1838-9: ADDISON, *Temple Church*, 8vo., 1843: RICHARDSON, *Effigies in Temple Ch.*, 4to., 1843: DENHAM, *S. Dunstan's in the West*, fol., 1829: WILKINSON, *S. Martin Outwich*, 4to., 1797.

HERBERT, *Inns of Court and Chancery*, 4to., 1804: IRELAND, *Pict. Illust. of Inns of Court*, 4to., 1800: ACKERMANN, *History of Colleges*, 4to., 1816: BEARCROFT, *Charterhouse*, 8vo., 1737: CARLOS, *Crosby Place*, 12mo., 1832: HOLFORD, *Milbank Penitentiary*, 8vo., 1828: BRAYLEY, *Theatres*, 4to., 1826.

MATTHEWS, *Hydraulia*, 8vo., 1835: THOMSON, *Chronicles of London Bridge*, 8vo., 1827; 2nd edit., 1839.

LIST No. 6.—ARCHITECTURAL PUBLICATIONS.

CAMPBELL, *Vitruvius Britannicus*, 3 vols., fol., 1715-31: KENT, *Designs by I. Jones*, fol., 1727: GIBBS, *Book of Architecture*; *Designs*, fol., 1728; 2nd edit. 1739: VANDY, *Designs by Jones and Kent*, 8vo., 1744: SOCIETY OF ANTIQUARIES, *Vetusta Monumenta*, 7 vols., 1747-1845: ADAMS (R. and J.), *Works*, 3 vols., fol., 1773-1822: TAYLOR, *Works in Architecture*, fol., 1790: WOOLFE and GANDON, *Vitruvius Britannicus*, 2 vols., fol., 1767-71: RICHARDSON, *Vitruvius Britannicus*, 2 vols., fol., 1802: SOANE, *Designs for Public Impts.*, fol., 1828: BRITTON and PUGIN, *Public Edifices*, 2 vols., 8vo., 1833-8; with Suppl. by LEEDS, 8vo., 1838: LAXTON, *Examples of Building Construction*, 80 parts, large fol., 1855-58: DAY, *Architectural Precedents*, 8vo., 1847: DONALDSON, *Specifications*, 2 vols., 8vo., 1859.

Plans of the Docks, and Plans for the Improvement of the Port of London, 3 plates, fol., 1799-1800: LABELYE, *Westminster Bridge*, 1741: RENNIE and COOKE, *Views of Old and New Lond. Bridges*, fol., 1833: CRESY, *Practical Treatise on Bridge Building*, fol., 1839: HANN and HOSKING, *Architecture*, etc., of Bridges, 8vo., 1843.

SOCIETY OF ANTIQUARIES, *The Tower*, fol., 1815.

SMIRKE, *Ancient Palace at Whitehall*, fol., 1832: BRAYLEY and BRITTON, *Ancient Palace of Westminster*, 8vo., 1836: COTTINGHAM, *Westminster Hall*, fol., 1822: SMIRKE, *Arch. Hist. of Westminster Hall*, 4to., 1836: WARRINGTON, *Houses of Parliament*, fol., 1850: MACKENZIE, *S. Stephen's Chapel, Westminster*, fol., 1844: COTTINGHAM, *Henry VII chapel*, fol., 1822-9: HARDING, *Ancient Paintings and Brasses in Westminster Abbey*, fol., 1825.

CLAYTON, *Churches of Sir C. Wren*, fol., 1849: NASH, *Temple Church*, fol., 1818: BILLINGS, *Temple Church*, 4to., 1838: SMIRKE and ESSEX, *Temple Church*, 4to., 1845.

RICHARDSON, *Hall of Middle Temple*, 4to., 1844.

LAING, *Custom House and S. Dunstan's in the East church*, fol., 1818.

EDWARDS, *Auction Mart*, 4to., 1809.

WYATT, *Drury-lane Theatre*, 4to. 1813.

JEBB, *Pentonville Prison*, 8vo., 1844: MIDDLETON, *House of Correction*, fol., 1788.

ASHPITEL and WHICHORD, *Baths and Washhouses*, 8vo., 1853: BALY, *Baths and Washhouses*, 4to., 1852; Appendix, 1853.

BERLYN and FOWLER, *Crystal Palace*, 8vo., 1851: DOWNES, *Crystal Palace*, 8vo., 1852.

BLACKBURN, *Crosby Hall*, 8vo., 1834: HAMMON, *Crosby Hall*, 4to., 1844: LEEDS and BARRY, *Travellers' Club House*, 4to., 1839: BRITTON, *Sir J. Soane's House*, 4to., 1827: (WEALE,) *Modern Architecture*; *Examples of Villas*, 4to.: WHITTOCK, *Shop Fronts*, 4to., 1840.

LIST No. 7.—GENERAL VIEWS AND SPECIAL ILLUSTRATIONS.

HOLLAR, *View of London*, 7 sheets, 1647; and *View in 2* ARCH. PUB. SOC.

sheets, 1666: MOXON, *View of L. from Southwark*, cir. 1599, 1771: VISSCHER, *View*, 4 sheets, 1616.

HOLLAR, *View of S. Saviour's Church, Southwark*, 1661: FISHER and VERTUE, *Plan of Whitehall*, 1680, engr. 1747: MOSS, *Old Somerset House*, 2 plates, 1777: BALDWIN, *Blackfriars Bridge*, 2 plates, 1766: I. JONES, *Whitehall Palace*, 4 plates, 1748-9: KENT, *Treasury, S. James's Park*, 1733: JEFFERYS, *Northumberland House*, Strand front, 1752: GWYN and WALE, *Section of S. Paul's*, 1755; and *Plan in 2 sheets*, 1758: PAPWORTH, *S. Bride's Steeple and Avenue*, 1825: STATIONERS' COMPANY, *Heads to Almanacks* for each year, from 1836: HAWKSMORE, *S. Mary Le Bow Church*, 1726: DONOWELL, *S. Giles in the Fields Church*, 2 plates, 1753: INWOOD, *S. Pancras Church*, 1822: CHRISTOPHER, *Bow Church Tower*, 1858: HANSARD, *Banqueting House, Whitehall*, 3 plates, 1850.

LIST No. 8.—MAGAZINES AND JOURNALS.

The GENTLEMAN'S MAGAZINE, 8vo., 1731 to 1867: UNIVERSAL MAGAZINE, 8vo., 1747 to 1814: EUROPEAN MAGAZINE, 8vo., 1782 to 1826: ARCHÆOLOGIA of the Society of Antiquaries, 4to., 1773 and cont.: LONDON, *Architectural Magazine*, 8vo., 1834-38: CIVIL ENGINEER, AND ARCHITECT, 4to., 1837 to 1868: SURVEYOR, ENGINEER, AND ARCHITECT, 3 vols., 4to., 1840-42; continued in vol. 4 as ARCHITECT, ENGINEER, AND SURVEYOR, 1843: COMPANION TO THE BRITISH ALMANACK, annual particulars of new buildings, 8vo., 1828 and cont.: ILLUSTRATED LONDON NEWS, fol., 1842 and cont.: PICTORIAL TIMES, fol.: BUILDER, 4to., 1843 and cont.: ARCHITECT AND BUILDING OPERATIVE, 4to., 1849-50: LAND AND BUILDING NEWS, 4to., 1855; continued as BUILDING NEWS, 4to., 1856 and cont.: ARCHITECT, 4to., 1860 in progress.

LONDON (ELYAS DE), see BERHAM (H. DE); DEREHAM or DERHAM (E. DE); and ELYAS.

LONDON CLAY. A considerable deposit, classed by modern geologists in the eocene tertiary series, immediately covering the chalk formation in the basin of the Thames. The name of London clay has been applied to the whole division, which is capable of sub-classification into i, the plastic clays immediately overlying the chalk; and ii, the London clay proper. The plastic clay formation is most largely developed in the eastern portion of the basin of the Thames; the greatest thickness, in the north-east of Kent, is about 120 ft.; under London it is 75 ft.; at Claremont 60 ft.; and at Hungerford 48 ft. It is from the beds constituting this formation that the artesian wells of the metropolis derive their supplies. Commercially, it furnishes earths admirably adapted for the manufacture of pottery; and the sandy loams found in it are much used by iron founders for making the moulds used in casting. London clay proper, lying on the plastic clay, is a mass of very great extent and of considerable thickness, supposed to be even as much as 620 to 650 ft. Some of the lower beds are yellowish white, or variegated; unctuous; and laminated; their chemical composition partakes of the nature of calcareous marls. The upper beds are most frequently brown, and near the top are mixed with light coloured sands, in sufficient quantities to form a good brickearth without additions, the middle beds are mostly bluish grey. Green sand is occasionally interspersed: rounded flint pebbles also occur in these lower parts of the formation. The nodules of septaria are collected to a very great extent upon the shore of the isle of Sheppey for the purpose of making the so-called Roman cement. When the London clays are of a red colour, from the presence of ochreous iron, they are used for the manufacture of bricks. Further geological details of the formation, and the Bagshot sand beds over it, will be obtained in WEALE, *Pictorial Handbook of London*, 8vo., London, 1851, p. 32-6. The formation of the London and Croydon railway laid open a complete section of the London clay down to its junction with the plastic clay, as shown in a woodcut in Institution of Civil Engineers, *Proceed-*

ings, 8vo., London, 1844, iii, 138. MYLNE, *Sections of the London Strata*, 4to., Lond., 1850; MYLNE, *Map of the Geology and Contours of London and its Environs*, 1856.

LONDONDERRY, or DERRY ("the place of oaks") as it is often still called. The chief city of the county of the same name, in Ireland; it is situated on the west bank of the river Foyle; the timber bridge has lately been pulled down. A drawing had been made for a new bridge by C. May, C.E.; but a competition for a design was opened early in 1857; this resulted in the usual dissatisfaction; the premium was awarded to G. R. Long (*BUILDER Journal*, 1857, and 1858, xvi, 16). Subsequently a design for a girder bridge supported by suspension chains was made by P. W. Barlow, C.E. (*PENNY CYCLOPEDIA*, Suppl., 1858, p. 84), which does not appear to have been carried out; as a wrought iron girder bridge for a railway with a roadway over it, placed about 750 ft. south-west of the old bridge, was erected 1859-63 under J. Hawkshaw, C.E., by J. Butler and Son of Leeds; the contract without the approaches was about £60,000. The six main spans are each 119 ft.; the eight piers are formed by sixteen iron columns 11 ft. diameter 24 ft. apart, and an independent pier 30 ft. diameter for the swivel bridge or turn table, giving an opening in the platform of 45 ft. 6 ins. span for the navigation, and two land openings, one at each end, of 62 ft. span (*DUBLIN BUILDER Journal*, ii, 250). The third cylinder pier is recorded to have given way, *BUILDER Journal*, Feb., 1861, xix, 81. It is 1172 ft. in length, and 30 ft. wide; the upper roadway 20 ft. wide; the height of the railway above low water is 14 ft.; same *Journal*, 1863, xxi, 727. A new line of quays was commenced August 1856 under D. and J. Stephenson, C.E. of Edinburgh, and in 1860 at least 2817 ft. on the west side of the river were completed; and double that length in continuation to the new graving dock was contracted for. This graving dock 1859-60, was 365 ft. long, 50 ft. wide at the base, and 86 ft. at the top, costing about £20,000 (*DUBLIN BUILDER Journal*, ii, 250).

The city stands on an oval shaped hill 119 ft. high; a great part was burnt 1668. The older portion is still surrounded by a wall 24 ft. high, the rampart of which is kept in repair, and is about 5400 ft. in circuit, in which are six gates having three archways to each; Bishop's gate, the best, was rebuilt 1788-9 by H. A. Baker, and three others 1803-8; at Magazine-street, a new gateway was made 1864-5 by F. Louch, of Glasgow stone, at a cost of about £500. Diamond-square is situated in the centre, and from it radiate the four principal thoroughfares; some of the streets are very steep and do not present a good appearance; there are a few good private dwellings and some spacious shops. Water was first laid on in elm pipes 1808-9, and gas has been introduced. The first Improvement Act was passed August 1848 for paving and widening streets, erecting water works, and effecting a system of sewerage; a second Act was obtained June 1855. On the opposite side of the river is a large suburb called Waterside. A column of Portland stone of a total height of 90 ft., of the Doric order, designed 1826 by James Henry, is surmounted by a statue by John Smith of Dublin, of the rev. George Walker, the governor of the city during the siege 1689 of one hundred and five days; it was displayed 12 Aug. 1828, and cost £1285. The cemetery consists of twenty-eight acres; the entrance and keeper's residence 1859-60 by F. Louch, in Scotch sandstone and cost about £635. The railway to Enniskillen was opened 1854; the line has been extended to Coleraine. The town is the seat of the see of Derry.

The original cathedral dedicated to S. Columba, was founded 1164 by Murtogh O'Neil, archbishop of Ireland; it was 90 ft. or paces long. A new cathedral on a new site was commenced 1628 by the citizens of London, and completed 1633 as stated on a tablet; it is probably the last old cathedral erected in the Gothic style in Ireland; it was built "by one Parrott" under the superintendence of Sir J. Vaughan, Knt., governor of Derry, and cost £4000. It consists (1828) of a nave and

aisles with a gallery over each aisle, but it is called "nave and chancel with long aisle galleries" by WALCOTT, *Cathedrals*, 8vo., Lond., 1860, p. 299. In 1825 it was thoroughly repaired (BELL, *Prize Essay*, 8vo., Dublin, 1828, p. 122) by Mark Murray, who also 1803-5 rebuilt the steeple as the old one had given way under the timber spire erected 1776. It was again restored internally 1861-2 by Welland and Gillespie. The interior length is 106 ft. 9 ins.; width 22 ft.; each aisle 15 ft.; total width 52 ft. Height of the steeple and spire 178 ft., of which the tower is 89 ft.; it is called 210 and 228 ft. to the top of the cross. WALCOTT gives the size without the tower as 114 ft. long, 66 ft. wide, and 46 ft. high. There are two other protestant churches. The first Roman catholic chapel was erected 1784-6 and completed 1810: the Derry R. C. cathedral, in an "Early Perpendicular" style, was continued by McCarthy, with nave and aisles (18 ft. wide) 120 ft. long, and chancel 38 ft. long, each 25 ft. wide, besides chapels, north porch, tower 23 ft. by 18 ft., enriched with niches, panelling and pinnacles, intended to be surmounted by a spire rising 300 ft.; the chancel arch is 61 ft. high: the walls are of mica slate, with dressings externally of granite, and internally of a Scotch sandstone: it was ready for roofing in 1858, and nearly completed 1862; COMPANION TO THE ALMANACK, 1845, p. 245. The convent of the Sisters of Mercy was formerly Birch's hotel. There are also four presbyterian chapels, one erected 1835 by Stewart Gordon, county surveyor, at a cost of £2000; an independent chapel; two methodist meeting houses; a congregational union church and schools; and the Covenanters' church, both the latter buildings were erected 1857-8 by W. Raffles Brown of Liverpool.

Amongst the other principal edifices are the following: the episcopal palace built 1746, and nearly rebuilt 1768; the deanery 1833 at a cost of £3481; the corporation hall in Diamond-square, designed by captain Francis Neville 1692, and mostly rebuilt 1826 at a cost of £5500: the ill arranged court house 126 ft. by 66 ft. (Grecian) 1814-7 by John Bowden, at a cost of £30,480; the jail 1819-24 by Messrs. Henry, Mullins, and M'Mahon, on the circular plan and very complete, 242 ft. frontage, at a cost of £33,718 Irish; the custom house 1803-9-26; the union workhouse opened 1840; the lunatic asylum 1827-9, by W. Murray from the design of P. Johnston of Dublin, 364 ft. frontage, at a cost of £25,678 for 100 patients and enlarged for 150: the county infirmary 1810 by Edward Edgar, under the superintendence of — Woodgate of Dublin, at a cost of £7700; the linen hall; and the new barracks. The several markets are commodious structures. The diocesan free grammar school or Foyle college, was erected 1814 at a cost of £13,000; there are several other schools; as Gwyn's institution for 200 poor boys, 1837-40; the Magee college (Tudor) 190 ft. long by 58 ft. deep, designed 1858-61 by E. P. Gribbon of Dublin, carried out by S. Gordon county surveyor, in Scotch sandstone and local random ashlar stone, at a cost of about £8000 (*DUBLIN BUILDER Journal*, ii, 250); and the district national model school 1860-61 by James Owen for the Board of Public Works, 208 ft. total length, to cost about £6000 for all the works (same *Journal*, ii, 250). The Ulster bank was designed 1859 by T. Jackson of Belfast (*DUBLIN BUILDER Journal*, ii, 175). A record building was erected by the Board of Works 1861.

28. 50.

A *View of L.*, two feet long, published by McGuire 1800 shows the bridge and bishop Hervey's spire. HEMPTON, *Siege and History of L.*, 8vo., Londonderry, 1861; LACY, *Sights*, etc., 8vo., London, 1863; LAWSON, *Gazetteer*, 12mo., Edinb., 1842; WRIGHT, *Ireland Illustrated*, 4to., London, 1829 31, p. 65, 75, 79; COLBY, *Ordnance Survey of the County; History of the County*, 4to., Dublin, 1837, i, and p. 217; 233.

About five miles distant is the fortification, or palace of the northern Irish kings from a very early period down to the beginning of the twelfth century, called the Griannan of Aileach, described herein under both those names.

LONDON WHITE, see WHITE LEAD.

LONG (JOHN), master mason 1421-2 at York cathedral, received £10 for his fee and had eighteen masons working under him; he was succeeded by T. Pak; *SURTEES SOCIETY, York Fabric Rolls*, 8vo., Durham, 1859, p. 42, 46.

LONG (ROBERT CAREY), designed the union bank; S. Paul's church; and 1807-12 the medical college in Lombard-street; all at Baltimore; *DUNLAP, Arts of Design*, 8vo., New York, 1834.

LONGA (LUCAS DE), supposed to have been a native of Mendaro, designed 1693 the church at Elgoibar in the province of Guipuzcoa in Spain; he superintended its erection until his death 1714, when he was succeeded by T. de Laraza. The casas grandes at Alzola on the river Deva in the same province, with some portals on pillars and others on arcades, with capacious magazines on the first story, were built by him. 66.

LONG AND SHORT WORK, see SAXON ARCHITECTURE.

LONGANNET STONE. The quarry is situated in the parish of Tulliallan near Kincardine, in Perthshire, on the river Forth, and has long had great reputation. It consists of freestone; that is sandstone, both yellow and white, of a small grain, receiving a fine polish. The royal exchange, infirmary, and register office, in Edinburgh; and one of the churches in Aberdeen, were partly built from it. It is also said that it was used in the erection of the stadthuis at Amsterdam; it was for some time wrought by a Dutch company; *FORSYTH, Beauties*, etc., 8vo., Edinburgh, 1808, iv, 269. The *Report of the Commissioners on Stone*, 1839, states that this stone consists of fine quartz grains with siliceous cement, containing oxide of iron, and having a few plates of mica; the colour is a light ferruginous brown. It weighs 131 lbs. 11 ozs. per cubic foot. The beds are 5 ft. thick, and supply blocks 4 to 5 tons in weight. Tulle Mare castle, Perthshire, and part of a street in Perth, are built of this stone.

LONGFORD STONE. The quarry is situated at Creeve near Longford, co. Longford, in Ireland, and is extensively worked. The limestone of the county is generally of a dark blue colour, or of the black flat bedded and more earthy calp. This quarry yields the best stone; it is of a light grey colour, occurring in flat beds from 3 ins. to 3 ft. thick, from which stones of large size, sometimes 10 ft. long by 5 and 6 ft. wide, can be obtained: the deeper beds are supposed to produce very large blocks. It works well but is inclined to show damp. This stone has been used at baron Lefroy's house at Carrickglass. Several other limestone quarries are worked around Longford; as at Trelick, two miles south of the town, where good dark blue limestone well suited for rubble work, is procured. At Cashel quarry, sixteen miles distant, very large sized stones can be obtained capable of forming columns 3 ft. in diameter; blocks from 10 to 12 ft. in length are sometimes quarried; it is of a lighter colour and less compact than many other stones.

Sandstone is extensively quarried and used in buildings in the town: in a quarry about a quarter of a mile distant, are three principal beds, the upper one about 2 ft. thick, and two lower beds each 4 ft. thick; blocks 6 ft. square and 4 ft. thick can occasionally be raised. In the quarry the colour is yellowish, but the stone becomes nearly white after a time, and though soft at first it hardens by exposure; the grains are of white quartz, with a white siliceous calcareous cement and ferruginous spots. A cubic foot in a dry state weighs 141 lbs.; it will absorb 5½ lbs. of water after eighty-eight hours' immersion; a weight of 1709 lbs. broke a stone 3 ins. square with a twelve inch bearing; *WILKINSON, Geology, etc., of Ireland*, 8vo., London, 1845, p. 259, and App. No. 73.

LONGHENA (BALDASSARE), born at Venice, was the son of Melchisedech, a native of Como, and is said to have been a pupil of Scamozzi. The cathedral at Chiozza is said by Tschischka to have been built upon a design of this artist 1623; but 1633 by other writers. He appears to have commenced his career in Venice by acting as assistant to Marco

della Carità in the completion 1633 of the procuratie nuove; on the death 1640 of that architect, the appointment as proto della procuratia de' supra was given to Longhena, who retained it for life. Many of his works are given in the plates (herein numbered) of CARLEVARI, *Fabrice*, fol., Venice, 1703. He designed for the PP. Somaschi the church of Sta. Maria delle Salute, called la Salute (pl. 4), the first stone being laid 25 March 1631, but had not completed it in 1660, on a design which SANTI, *Ricordo di fra F. Colonna*, etc., 8vo., Venice, 1837, shows was taken from the *Hyperlotomachia*, even so much as the scrolled counterforts of the drum; the dome is interiorly a brick hemisphere, but the external catenarian covering is of timber (LAMINATED RIB): a plan and section are in CICOGNARA, ii; the adjacent seminario is also his work: and he designed 1637 the monument of the doge Domenico Morosini (ob. 1155) in the church of S. Giorgio Maggiore. Afterwards his style lost a comparative simplicity by his search for novelty: the results were the palazzi Pesaro "grandioso nel suo barocco" (pl. 79; a good woodcut is given in *BUILDING NEWS Journal*, 1860, vi, 823-7); Rezzonico, "barocco", up to the third order, which was added by G. Massari; Capovilla, "a furia di bizzarrie"; Giustinian-Lolin a S. Vitale, "corrotto", but less extravagant (pl. 66); Leze (or Da Leze) alia Misericordia, (pl. 97); and Vidimano (properly Widmann) a S. Canciano, (pl. 99): and the palazzo Battaglia is mentioned by TSCHISCHKA. He added the sumptuous staircase to the monastery of S. Giorgio Maggiore; the high altar 1649 to the church of S. Francesco della Vigna; the high altar to that of S. Pietro di Castello, where he built a chapel in which "il barocco toccasse il vertice delle follie"; the front of the ospedaleto, "trabocco di peggio", (pl. 33); the less barbarous church (now secularised) of the Augustinian nunnery of Sta. Giustina (pl. 16) 1640; and the interior 1649-89 of the chiesa degli Scalzi, where his "pandemonio" of details was transcended by the "maggiore delirio architettonico" of the high altar that was added by the Carmelite monk G. Pozzo, brother of the celebrated Jesuit Andrea; the front of the church is a later work by G. Sardi. The façades of the church of S. Salvatore and the neighbouring scuola di S. Teodoro have been ascribed to Longhena as well as to G. Sardi (the name of Salvi must be considered an error in SELVATICO, pp. 422 and 428), who, after Longhena had submitted two designs for the dogana, was selected 1676 to compete for that work against A. Cominelli and G. Benoni (his pupil); the design made by the latter was selected, although his estimate far exceeded that of the others. The monument 1669 of the doge Giovanni Pesaro (ob. 1659) in the church of Sta. Maria de' Frari is one of the latest works by Longhena mentioned in SELVATICO, *Sulla Architettura*, etc., Venice, 1847, pp. 411-424, who gives the above criticisms left in the force of his own words: he is inclined to add to the list the monument of the Paruta family, erected after 1629 in the chiesa di Spirito Santo, and p. 437 mentions the palazzo de' Flangini a S. Geremia, by an architect whose name is lost, as a work sufficiently in the style of Longhena to be attributed to him. He died 1682 being over eighty years of age. His name is also attached by CARLEVARI to the palazzi Giustiniani a S. Vitale (pl. 66), Battaglia (pl. 78), Morosini a S. Cantiano (pl. 98), and Zaune on the rio di S. Agostino (pl. 102). The *BAUZEITUNG*, 1849, pl. 243, gives the Pesaro palace. 3. 26. 28. 30. 112.

LONGHO and LONGO (M. and O), see LUNGT (M. and O).

LONGITUDINAL SECTION. A drawing showing the interior arrangements on a vertical plane taken generally in a straight line through the greatest length of a building; sometimes the line is made to deviate so as to authorise the representation of any particular part not coming in the direct line. The line adopted is generally dotted or drawn in red ink on the various plans, and referred to by letters at the bottom of the section.

LOGLUNE or LONGLUENE (ZACHARIAS), was born at

Paris, where he became a pupil of Le Pautre, and afterwards of Jean de Bott, with whom he entered the service of Prussia about 1700. Frederick I sent him to travel in Italy, after whose death 1713 he was discharged. He was invited about 1728 to Dresden by Augustus II, in which city he erected the barracks near the Bautzner-platz 1732 after his master's design; with other works; he became chief architect or oberlandbaumeister, and died there in 1748. DASSDORF, *Beschreibung*, 8vo., Dresden, 1782, p. 141; LEHNINGER, *Description de Dresde*, 12mo., Dresden, 1782, p. 145. 68.

LONG MEASURE. The measure as applied to the length of things and to the distance of points or places. **LAND; LINEAL; MEASURE.**

LONGO, see **LUNGH**.

LONGO (ANTONIO), born 1740 or 1742 at Varenna in the Tyrol, was chiefly a painter; and is said to have designed the tower at Tesara. He began the tower in the *place* at Cavalese in the district of Trent in Austria, which remained incomplete at his death at Varenna, in priest's orders 26 May 1820. 26. 68.

LONGONE (GIOVANNI BATTISTA), born at Monza in the duchy of Milan, studied under J. A. Castelli, and resided at Milan at the beginning of the eighteenth century. His son ANTONIO succeeded to his practice. 5. 30.

LONG PLANE. The long plane used by carpenters for finishing their work; it is the same that joiners call a **JOINTER**.

LONGRIDGE STONE. A sandstone of the millstone grit formation, obtained at a quarry situated a few miles north-east of Preston, in Lancashire. It is a rather hard compact stone of moderately fine grit, in layers from 6 to 30 ins. thick; generally of a uniform light brown tint scarcely distinguishable from many of the Yorkshire stones, with deeper markings of brown; in a few exceptional layers it is mixed with, or is wholly of a, light blue colour; such stones when exposed to the weather turn black, from which it is supposed that they are impregnated with metal. Longridge stone is moderately hard but works freely; where exposed fully to the weather and laid on its quarry bed, it has proved very durable; sometimes it has failed under projections where being damp in the shade the sun and wind have not dried it.

The quarries have not been in existence above seventy years, and have only been extensively worked during the last forty or fifty years; they now supply about 250,000 cubic feet per annum. It is the only stone used locally for external purposes; as to all the churches in Preston and its neighbourhood, and to the new town hall erected 1867 by G. G. Scott R.A.: to the Borough buildings; the royal bank 1838; the York buildings, Dale-street, by J. E. Pictou (*BUILDING NEWS Journal*, 1857, iii, 582), and other edifices at Liverpool: and to the parish church now (1868-9) rebuilding at Bolton, etc.

The Longridge delf quarry supplies a freestone of the same formation; it has been used at the Borough markets, Liverpool; and in the chief front of the new market at Bolton. *Memoirs of the Geological Survey, Mineral Statistics*, by R. Hunt, 8vo., London, 1860, p. 218.

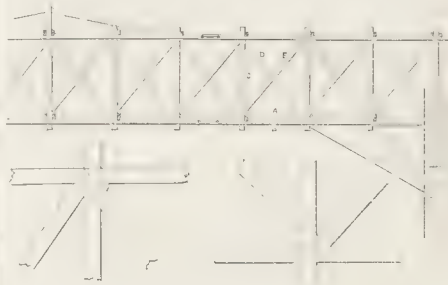
LONG ROOM. The name given to a great hall in a few large structures. It is usually applied to the principal room in a custom house, as at London (**LAING**); and at GENOA (p. 24); and is officially so used.

LONGSETTLE, formerly written Langeetel. A bench with back and arms to it; **SURTEES SOCIETY**, *York Fabric Rolls*, 8vo., Durham, 1859, p. 346.

LONGSUND. One of the minor ports in Norway, from whence, as well as from Porsgrund, Krageroe, and Arundel, was exported timber during the period when the duties were low, of a very bad description, even worse than the inferior timber from America. The timber was from 10 to 16 ft. in length and 2 ins. thick; the shipments were formerly very considerable, but in 1835 they were comparatively insignificant. It was sent in three different states of manufacture; 1, hewn perfectly square, from 7 to 10 ins., and called die square tim-

ber; 2, octagon or nearly round timber, and generally very sappy; and 3, flat timber: besides the yellow timber of these three sorts, there was also white timber of each sort (in 1761 to 1811 when the duty was raised). The yellow die square timber for its size was the stiffest; and the best of it was found very durable. Most of the Brevig timber used to be shipped at Longsund (properly written Langesund); *Report of Select Committee on Timber Duties*, fol., 1835, p. 328; 372.

LONG'S PATENT FRAME BRIDGE. The principal merit of this system, as explained by its inventor, *Description*, etc., Concord, 1836, consists in its requiring only a small quantity of timber and exerting no lateral thrust. Bridges of from 100 to 150 ft. span are very commonly met on the different lines of railway in the United States of America: some of the best specimens were erected near Boston, under the direction of — Fessenden, engineer. The 'string pieces' b, or head and sill,



are formed of three beams on plan; the 'posts' c, and 'mainbraces' or struts d, of two pieces; and the other reverse struts or 'counter braces' e, of one piece. The junctions of the various pieces are effected without bolts or spikes, a mode of construction that admits of the bridge being very easily repaired, when decay of the materials or other causes renders it necessary.

The timbers, as in Town's bridges, are all fitted together on the ground in the first instance, and then placed up by means of a scaffolding. **STEVENSON**, *Engineering of N. A.*, 8vo., London, 1838, p. 234; 2nd edit., 12mo., 1859, gives, plate 10, a bridge 110 ft. span and 15 ft. depth of truss; it is also shown in *ALLGEMEINE BAUZEITUNG*, 1839, ser. i, pl. 291, fig. 11-16; and 1851, ser. ii, pl. 388-9. **HANN and HOSKING**, *Bridges*, 8vo., London, 1843, give excviii, pl. 122, the bridge of seven equal openings of 180 ft. from centres of the piers, of the Western Railroad Connecticut river bridge. White pine (*Pinus strobus*) is generally considered the best timber for this kind of construction, as it combines lightness and rigidity, and is less liable to warp or cast on exposure to the atmosphere than most other timber of that country; **STEVENSON**, *Notice relative to Long's American Frame Bridge*, in *EDINBURGH NEW PHILOS. JOURNAL*, April 1841.

The same principle of construction with iron, was adopted early in the nineteenth century by Sir R. Smirke, who used cast-iron braces with wrought-iron ties and uprights. s. s.

LONG WOOD. In the "Assize of Wood", cir. 1528, it was determined "that every shyde of longe wood contayne in length xviii fote of assyse."

LONTANA (GIAMBATTISTA), see **LANTANA (G.)**

LONVIE MARBLE. Descending from Sévignac in the French Pyrenees, the rocks and precipices of limestone furnish the slabs of black and grey marble with which the door posts and lintels of even the humblest cottage are here adorned. A

little before reaching the village of Laruns, one of the most considerable in the valley, a snow white gash or scar, high up on the mountain side to the left, marks the situation of the white marble quarry of Louvie Soubiron: it has been used at Paris for the statues in the *place de la Concorde*, and for the bas reliefs on the front of the Madeleine. 28.

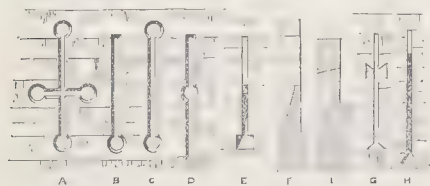
LOOKER'S VENTILATOR. A method of ventilation, patented about 1855 by B. Looker, jun., of Kingston-on-Thames. The invention consists of a tubular piece of pottery, metal or other material, from 4 to 6 or 8 ins. diameter, fixed into the wall of a building, thus communicating between an apartment and the open air; in it another tube with a closed end next the apartment is made to slide, the latter being perforated about two-thirds of its length with small holes made in a slanting direction. When the ventilator is open, or drawn out to any extent, fresh air may be admitted, or impure air find egress without any draught being felt. These ventilators are made of all lengths to suit any thickness of wall. Illustrations are given in the *Journals* of the above named dates.

The "Indicators", introduced by the same inventor, for cemeteries are made of terra cotta, with numbers, etc.

LOOKUM. A word used from about 1848 for a projection on the upper floor of a warehouse or mill, to cover a wheel and fall, or a crane, with a trap floor. It is probably derived from the Fr. *lucarne*, and the old English *LEUCOMB*. It usually projects about 4 ft., and is about 8 ft. wide, supported by the joists of the floor running out: in the London districts it is covered with metal and has proper gutters to it, to prevent rain-water dropping on the public way.

LOOP AND CREST, see **BATTLEMENT.**

LOOP HOLE, LOOP and LOUP (late Lat. *arbalistena*, *arbalistaria*, and *archeria*; It. *balestriera*, *feritoria*; Fr. *barbacane*; Ger. *schiess-scharte*). A narrow aperture, formed in the wall of a fortress, sometimes in the merlon of the battlement, through which the defenders discharged their bows or firearms. A small hole for the same purpose appears to have been called an *OYLET*. **BALISTARIA** or *balestraria* was the name of the room wherein the *baliste* or arbalests or cross-bows, and arrows or quarrels, were deposited. These apertures do not appear to have been used in Norman architecture, but seem to have come into use in the thirteenth century; they are sometimes of very considerable length, as at Tonbridge castle; and they continued to be employed until late in the fifteenth century, as at Summeries in Bedfordshire, and at Oxburgh in Norfolk. The ter-



minations of the aperture were often circular; and sometimes in the form of a shovel. It has also occasionally a circular enlargement in the middle. The loop occurs sometimes in the form of a cross, and is then usually found in the battlements of ecclesiastical buildings for ornament, as in the angular turrets of the tower of Kettering church, Northamptonshire, and in the canopy over the tomb of the Black Prince in Canterbury cathedral. **VIOLLET LE DUC**, *Dict.*, s.v. *créneau*, and *embrasure*, gives illustrations, and some peculiar in form, as woodcut. 17.

The term loop hole in fortification is now understood to denote the opening in a wall or stockade for the use of musketry, as an 'embrasure' is for the artillery. The opening is called either 'vertical' or 'horizontal', according to the position of the exterior opening. A full account of its formation is given in **CORPS OF ROYAL ENGINEERS**, *Aide Mémoire*, 8vo., London, 1850, ii, p. 308-15, with three plates.

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LOOP HOLE FRAME AND DOOR. A term used for the vertical series of doors on the outside of a warehouse which, according to the Metropolitan Building Act 1855, 18 and 19 Vict., c. 122, § 14, may be fixed within one inch and a half of the face of any external wall. It is also the same as is described in the Act of 1844, 7 and 8 Vict., c. 81, sched. D, as "tiers of door cases to warehouses", which by that Act were required to be not less than two inches from the external face of the wall.

LOOP WINDOW. A long and narrow upright opening, occasionally used during the Norman and Early English periods of mediæval architecture; resembling the usual lancet-shaped windows but with a square top and worked quite plain, as in the chancels of Cowley church, Oxfordshire, and Tixover church, Rutlandshire. The same form occurs at Ringstead, Northamptonshire, with an arched head over it, trefoiled and ornamented but not pierced; this example is engraved in **RICKMAN**, *Attempt*, 8vo., Lond., 5th edit., 1848, p. 94.

LOOSE BOX. The term used for the space devoted in a stable to a horse when it is not necessary to be tied in a stall, so as to have freedom to move about, especially if sick. Loose boxes are made about 20 or 22 ft. by 13 ft., with the usual fittings of a stall.

LOPEZ (BERNARDO), succeeded D. Cerdana as *aparcjador* and *maestro mayor* of the royal works at Aranjuez: on his death M. Correas was appointed to the same office 20 March 1684. 66.

LOPEZ (MARTIN), began 1576 to construct in the monastery of Minims at Toledo, the *cuarto nuevo* facing the river: he directed the erection of the refectory, besides completing the capilla mayor with the body of the church, which had been commenced by H. Gonzalez de Lara, on the designs of H. de Egas and A. de Covarrubias, and which the younger N. de Vergara had continued badly. 66.

LOPEZ (PEDRO), was 1512 *maestro mayor* to the cathedral at Jaen, where he built the wall of the *testero* and where the capilla mayor was erected 1500-19; in both cases using Gothic details. 66.

LOPEZ DE ROJAS (JUAN), some time between 1537 and 1560 succeeded J. de Badajoz as *maestro mayor* of the church and monastery of S. Pedro at Exlonza, near Leon; he died at Exlonza in January 1572. 66.

LOPEZ DE ROJAS Y ALMANSA (EUFRASIO), succeeded about 1654 to J. de Aranda as *maestro mayor*, and 1660 to P. del Portillo in the direction of the works to the cathedral at Jaen. He executed the pillars and chapels from the *coro* to the principal front; and, having laid the foundations of the towers, constructed them with the façade. Dying 8 December 1684 he was buried in the iglesia de las carmelitas descalzas, which he had erected at his own expense in that city. 66.

LOPEZ DURANGO (EUGENIO), appointed 15 Aug. 1773 *aparcjador* of the cathedral at Toledo, became 28 Jan. 1786 *maestro mayor* there; he was superannuated 9 September 1793, and died 5 September 1794. 66.

LOPIZ (SIMON), was 1410 master of the royal works, and directed those of the castle, at Puente de la Reina, in Navarre. 66.

LORAGHO, see **LURAGO**.

LORCIGNES (GUÉRIN DE), is supposed to have built the collegiate church of S. Sépulchre in the rue S. Martin at Paris, because the portal bore the inscription in Gothic letters "L'an de grace mcccxxvii le vendredi devant noel fut chantee la premiere messe de cette eglise et les fondemens levez si comme il appert par maistre Guerin de Lorcignes qui erigea ce portail et le fonda premierement," etc, as given in **MILLIN**, *Antiq. Nationales*, 4to., Paris, 1790-9, iii, No. 27, p. 8. It is curious that **WHITTINGTON**, *Historical Survey*, 8vo., London, 1811, p. 77, cites this passage as proof that the church "was begun in 1326 and finished so as to have mass said in it in the succeeding year", whereas the first service is expressly said to have been performed on the same day that the foundations were begun. 66.

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The meaning of the last four words of the inscription is not clear; and it may be reasonably suspected that Maître Guérin was merely a benefactor, and not an architect as hitherto stated. 19.

LORENZ (MEISTER) of Ueberlingen, built 1505 the central tower of the cathedral at Colmar, in the department of the Haut Rhin, in France. 92.

LORENZETTO, see LUDOVICO (LORENZO DI).

LORENZO. Just inside the porta di Giove at S. Maria di Falleri near Civita Castellana, in Italy, is the abbazia di Sta. Maria, of the twelfth century; over the door is an ancient capital and these inscriptions; "Laurentius cum Jacopo filio suo fecit hoc opus", and "Hoc opus Q. Intavall. fieri fecit." The roof fell 1829, and the church is now deserted and in ruins. 28.

LORENZO (FILIPPO DI), is noticed as *capomaestro* 1384 and 1396 of the works at the cathedral at Florence; RUMOH, *Italienische Forschungen*, 8vo., Berlin, 1827-31, ii, 113-6; 160-3, as RICH, and NAGLER. The latter also names him (like Schorn) LORENZO DI FILIPPO, but states in error that he began 1421 the cupola. 26. 68.

LORENZO (SAN), of the Dominican order, was living in Portugal in the thirteenth century; and built the bridge of Cavaz or Cavez, as noticed s. v. San Gonsalvo. 3. 69.

LORETO, sometimes written LORETTO. A city, consisting chiefly of one long narrow street with well built houses, situated near the mouth of the river Musone, in the province of Macerata, in the Papal states of Italy. It stands on a bold eminence surrounded by walls and towers with deep moats constructed 1586; and is amply supplied with water by an aqueduct constructed for Paul V (1605-21) across the valley to the subterranean canal from Recanati, at an expense of £40,000, by Giovanni Fontana. In the piazza della Madonna or del Santuario is a large fountain richly ornamented, a work by the pupils of Calcagni; the iron statues were cast about 1630 by P. P. Jacometti. This is represented in *Illustrations*, 1849-50, ii, pt. 2, pl. 49, s. v. Piazza, which shows the area occupied on one side by the monastery of the Jesuits; at one end by the chiesa di Sta. Maria, or della Sta. Casa; and on the other side and end by the campanile, and the governor's palace hereafter mentioned: a large view of the area, by Vasi, after the restorations of 1752 is in the king's library at the British Museum. In front of the church is a bronze statue of pope Sixtus V (1585-90) by Calcagni of Recanati.

The town owes its celebrity to the Sta. Casa, which is said to be the very house in which the Saviour lived at Nazareth, and to be now existent in the place where it finally settled 1295 after its miraculous transportation 10 Dec. 1294 to Loreto. It is a room said (*Handbook*) to be 26 ft. 6 ins. long, 12 ft. 6 ins. wide, and 13 ft. 6 ins. high, with a north door, a west window, and a fireplace at the east end. It is given in BLAEU, *Nouveau Théâtre d'Italie*, fol., Amst., 1704, ii, with its decorations, and appears to measure about 29 ft. 6 ins. by 13 ft., and 16 ft. high. He also gives to a large scale the plan and elevations of the marble *fodera* or screen enclosing, but leaving a passage round, it; its dimensions are 40 ft. by 25 ft., and 20 ft. high: this casing was designed by Bramante, and is described by VASARI, s. v. A. (Contucci) dal Monte Sansavino who executed the sculptures. BLAEU also gives a plan of the church, with a plan and view of the town. PHILLIPPON, *Le véritable plan, etc., de la maison, etc.*, fol., 1649; MURRI, *Relazione, etc., della Sta. Casa*, 12mo., Loreto, 1820; 19th edit. 1845; BARTOLI, *Glorie del Santuario di L.*, 8vo., Macerata, 1677; 1690. The church itself, in which this room is erected, was small, and had a roof resting on brick columns, when Giuliano da Majano began to rebuild it for Paul II (1464-71); after his death 1490 the works were continued by Giuliano (Giamberti) da Sangallo, who roofed the building, and after three years' labour completed 13 May 1500 the octagonal cupola. The foundations yielded 1526, and Antonio (Picconi)

da Sangallo was employed by Clement VII (1523-24) to strengthen the walls and piers and replace the roof: he redesigned the whole, continuing the transepts and aisles, and decorated the four piers of the cupola, which is called the *tribuna* by VASARI. As he died 1546, and as the façade bears the date 1583 with the names of cardinal Filippo Vastavillano and of his uncle Gregory XIII (1572-85), it may probably be ascribed to G. Alghisi. CIOGNARA, *Storia della Scultura*, fol., Venice, 1818, i, 265, pl. 6, gives the façade. Its great ornaments are the three bronze doors, which were finished under Paul V, they are hardly inferior to those at Pisa or at Florence: the right door was made by Calcagni, Jacometti, and Sebastiani, all natives of Recanati; the central one was cast by G. and A. Lombardo; the left door is the work of Tiburzio Verzelli of Camerino (a pupil of the elder Lombardo) who, with G. B. Vitali, executed the bronze font. The history of the church is the subject of MARTORELLI, *Teatro Storico della Santa Casa Nazarena*, fol., Rome, 1732.

The palace of the canonicate, palazzo apostolico, or governor's palace, was begun 1510 by Bramante and partly constructed by A. Contucci, at whose death 1529 it was unfinished: it was continued for Clement VII (1523-34) whose name is over one of the doors (shown in *Illustrations*) by A. (Picconi) da Sangallo, and subsequently up to 1536 by G. Boccacino. Five drawings in the collection of the Reale Galleria at Florence, refer to the church and palace; VASARI, *Vite*, 8vo., Flor., 1854, p. 65. The campanile, belonging to the palace and exhibiting four orders in as many stories and an octagonal bulbous pyramid, was designed by Vanvitelli and finished under Benedict XIV (1740-58), whose name appears on the building forming the end of the piazza shown in the *Illustrations*, 1849-50, pt. 1, pl. 33, s. v. Loggia: a bell, said to weigh 22,000 lbs., cast 1516 by Bernardino of Rimini for Leo X (1513-21) hangs in the campanile. The Capuchin hospital was founded 1740 by cardinal Barberini; near it is an hospital, maintained by the chapter, for the reception of poor pilgrims. The magnificent *portone*, 22 ft. 11½ ins. high and 9 ft. 4 ins. wide but slightly diminishing upwards, given in the *Illustrations*, 1848-9, pt. 2, pl. 18 s. v. Doorway, and by DONALDSON, *Modern Doorways*, 4to., London, 1836, has been ascribed to G. (Giamberti) and to A. (Picconi) da Sangallo; as both these architects died long before the time 1571-87 suggested in the panel of its frieze, it probably belongs to the period 1578-83 of the façade of the church and therefore to G. Alghisi. 28.

LORICA. A Latin word, implying defence or protection, which has been employed in several ways. It meant a breastplate such as that covered with scales, which, as worn by the emperors, was termed *ARGIS* in the time of MARTIAL. The word, translated *armatura* by the Italians, occurs in VIRUVIUS, ii, 8, where he directs that a wall of unburnt brick should have a band (*lorica*) 18 ins. high of tiles corbelled over on both sides as a coping to defend the lower work from rain if the tiles of the roof covering the top of the wall were disturbed or fractured. It is found in CÆSAR, "pinne loriceque ex cratibus atexuntur", where it seems to express a parapet, as is undoubtedly the meaning in QUINTUS CURTIUS, ix, 4, who says "angusta muri corona erat: non pinne, sicut alibi, fastigium ejus distinxerant; sed perpetua lorica obducta transitum sepeperat": it appears to have been also applied to the upper part of the podium by which the spectators in an amphitheatre were defended from the animals that were exhibited in the arena. By VEGETIUS, iv, the word is employed for a line of entrenchment made as circumvallation by a besieger. The word occurs in a difficult passage in VIRUVIUS, vii, 1, where he directs that after Tiburine tiles laid for a pavement have been levelled, washed, and polished, "incernatur marmor, et supra lorice ex calce et arena inducantur", where the apparent meaning is that a marble lining is to be put over it and the joints are to be filled with mortar, but where GWILT understands that marble dust is to be strewed and covered with a coat of lime and sand: it

must be allowed that "lorica testacea" has been held to mean a bed of tile-shards, with lime and sand.

LORICATIO. This Latin word has been translated as a "filling of walls with mortar"; but the passage where it occurs in **VITRUVIUS**, vii, 1, says that one floor of planks laid crosswise upon another gives to the joisting a double defence (*loricatio*): it is easy to see how this is allied to the advice "loricare solum granarii opere tectorio", and "loricare parietes", meaning to give a coat of plaster, which occur in **VARRO**. 4.

LORICULA. This Latin term has been translated as "a gallery or balcony, on a wall-side, with grates to keep one from falling" as employed by **HIRTIVS**: it is taken as equivalent to the Gr. στεφάνη in **S. JEROME**, *Contra Pelagianos*, citing **DEUTERONOMY**, xxii, where the English version has *battlement* but might better have been *parapet*: and it would seem that the original Hebrew word used in that place, occurs again in **EZEKIEL**, xl, where it is translated περίβολος in the Septuagint version; *murus* by **AQUILA** and **THEODOTIVS**; and *wall* in the English version.

LORICULA or **ELEVATION APERTURE.** A term formerly used for an opening in a church, now called **HAGIOSCOPE**.

LORIMER and **LORYMER.** A corruption of **LARMIER**.

LORINY (F. DE), is perhaps only known from the following title page; "*Liures de Portes Cocheres et Arcs de Triomphe, Tres utile à tous Architectes et Entrepreneurs, nouvellement inventés et dessinés par F. de L., architecte ordinaire de Son A. S. Jacques 2^e Roy d'Angleterre*, fol., Paris, 1688, 6 plates.

LORIoT (ANTOINE JOSEPH), born in 1716 "au moulin de Bannans, baillage de Pontarlier", became a member of the academy of architecture at Paris from 1735 to 1767, and was one of the fifteen members who made designs 1753 for the *place du pont Tournant* or de Louis XV in that city. He published *Mémoire sur une découverte dans l'art de bâtir,—la méthode de composer un ciment ou mortier propre à une infinité d'ouvrages, tant pour la construction que pour la décoration*, 8vo., Paris, 1774: *Instruction sur la nouvelle méthode de préparer le mortier*, 8vo., Paris, 1775; and *L'art de fixer la peinture au pastel*, issued by the académie royale de peinture et de sculpture, 4to., Paris, 1780. The first was translated as a *Practical Treatise on a Cement and Artificial Stone*, 8vo., Lond., 1774; 1775; and 4to., Dublin, 1776. On page 31 it is stated that the admixture of powdered quick lime in any mortar made with slaked lime is the most effectual method of giving it every desirable perfection; this is the chief discovery which he announces.

The proportion of the materials is thus stated on p. 32: "Take one part of brickdust finely sifted, two parts of fine river sand screened, and as much old slaked lime as may be sufficient to form mortar with water, in the usual method, but so wet withal as to serve for the slaking of as much powdered quick lime as amounts to one-fourth of the whole quantity of brickdust and sand. When the materials are well mixed, employ the composition quickly, as the smallest delay may render the application of it imperfect or impossible." On p. 40 another method is given: "Make a mixture of the dry materials; that is to say, of the sand, brickdust, and powdered quick lime, in the prescribed proportions; which mixture may be put in sacks each containing a quantity sufficient for one or two troughs of mortar. The above mentioned old slaked lime and water being prepared apart, the mixture is to be made in the manner of plaster, on the instant when it is wanted, and even on the scaffold, and is to be well chafed with the trowel." **BLONDEL**, *Cours d'Arch.*, 8vo., Paris, 1777, v, 197-207, devotes an article to this cement; and notices p. 380, its success in covering the arches of the orangery at the château de Versailles, and at the château de Trianon. The idea is described in detail in **NICHOLSON**, *Encyc. of Arch.*, 4to., Lond., 1852, i, 132: **DONALDSON**, *Stucco*, etc., in the **ENCYCLOPEDIA METROPOLITANA**, 4to., Lond., 1840, p. 176, states that this cement "was for a long time held in great reputation, but time has proved it to be quite ineffi-

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cacious." "To express Lorient's discovery briefly and dispassionately, I would say, when an ignorant artist makes mortar with whitening instead of lime, he can mend it considerably by adding lime to it: but his mortar will still be defective, in comparison with the best that can be made, by reason of the old slaked lime or whitening: for on repeated trials I found this to be the true state of the case"; **HIGGINS**, *Experiments — on Cements*, 8vo., London, 1780, p. 228. He died at Paris 9 December 1782. 112.

LORME (PHILIBERT DE), see **ORME** (P. DE L.).

LORRAINE CROSS. A cross having two projecting arms from each side of the upright shaft; as figured s. v. Cross. A few large churches have been built on this plan as that at Cluny, commenced 1089, consecrated 1131; that at Lincoln, commenced 1186; and that at Worcester, 1213-1350.

LORRAINE GLASS. Glass obtained from the district of the Vosges or Lorraine, as early as the thirteenth century, and then often called Burgundy glass. A glass factory was set up 1557 at Stourbridge by a number of refugees from Lorraine, headed by one called Henzole (now Ensell), as stated s. v. Glass, p. 46. In 1567-76 the English makers of glass were to pay 15d. for every case of Lorraine or Burgundy fashion containing 20 bundles=10 ft. each. **BURN**, *For. Protestant Refugees*, 8vo., Lond., 1846, p. 254. "At what tyme that troubles began in Fraunce and the lowe countryes, so that glass could not conveniently be brought from Loraine into England, certain glass-makers did covenant with Anthony Dollyne and Jno. Carye merchantes of the said low countryes to come and make glass in England;" Petition of Geo. Longe to Lord Burghley, about 1589, *Lansdowne MS.*, No. 59, art. 72, in the British Museum. Dollyne and Carye obtained a patent for making glass in England 8 September 1567 for twenty-one years (renewed 1576 for twenty-one years, **GLASS**, p. 46), on condition of teaching the art to Englishmen, and of paying certain customs to the crown; *Ibid.*; and in **TURNER**, *Domestic Architecture*, 8vo., London, 1851, i, 76. **FELIBIEN**, *Principes de l'Architecture*, 4to., Paris, 1699, 3rd edit., 183 et seq., directs that "when any one means to paint, let him choose Lorraine glass, which inclines to the white yellow, because that bears the fire the best, and receives the colour better than any other"; **HAWKINS**, *Hist. of Gothic Arch.*, 8vo., London, 1813, p. 236.

Lorraine glass was subsequently called 'French' and 'Normandy' glass: about 1788 it was made in ten glass-works, five in the forest of Lyons, four in the county of Eu, and one at Beaumont near Rouen. It was thinner than English crown-glass, and when laid on a piece of white paper appeared of a dirtyish green colour. There were but twenty-five tables of this glass in a case. 13.

LORYMER and **LORIMER**, see **LARMIER**.

LOSINGA or **LOZINGA**, see **HERBERT** (R. and W.).

LÖSSL (FRANZ), see **LOESSL** (F.).

LOTE or **NETTLE TREE**, see **CELTIS**.

LOTE (STEPHEN), citizen and mason of London, is named as working 1392-4 at the Savoy, in *Accounts of the Manor*, 16-17 Richard II, printed in the **ARCHÆOLOGIA**, 1832, xxiv, 302; and in conjunction with H. Yevele he contracted to execute a tomb according to pattern, in two years from Michaelmas 1395 and to erect the stone work of it, for the king's first wife Anne of Bohemia, in which tomb the king was also buried. They were to be paid £250. **NEALE**, *Westminster Abbey*, fol., London, 1823, ii, 111; **RYMER**, *Fœdera*, fol., Lond., 1709, 18 Rich. II, vii, 795.

LOTIO. The term used by **VITRUVIUS**, vii, 9, for the levigation of the material of a pigment.

LOTORIUM. A term used in a Close Roll 29 Henry III, (1244-5) and translated LAVATORY, by **TURNER**, *Domestic Arch.*, 8vo., London, 1851, p. 260.

LOTTI (COSMO), born at Florence, living in the first half of the seventeenth century, was also a painter and an engineer. He was a pupil of B. Poccetti. Upon the recommendation of

G. Parigi, king Philip IV (1621-65) of Spain obtained from him 1628 a design for the theatre to be erected in the palace of Buen Retiro at Madrid; and upon its completion the king appointed Lotti as royal architect and engineer; his mechanical inventions were *bizarre* and ingenious. He resided at Madrid, in which city he died, but the year is not known. 2. 112.

LOTTI (LORENZETTO), see LUDOVICO (L. DA.)

LOTTICI (MATRIZIO) of Parma, with G. Mattioli, designed the theatre 1727 at Gubbio in Italy.

LOTUS; LOTUS CAPITAL, AND COLUMN. The name given by the ancients to a plant, or to plants, and now unassignable with certainty, as noticed in essays by MAHUEL, and by BARTHÉLEMY, in the *ACADÉMIE DES INSCRIPTIONS ET BELLES LETTRES, Histoire*, 4to., Paris, 1717, ii; and 1723, iii, 181; by DESFONTAINES, in the *ACADÉMIE DES SCIENCES, Mémoires*, ii; by SAVIGNY and by RAFFENEAU DELILE in the *MUSÉUM D'HISTOIRE NATURELLE, Annales*, 4to., Paris, 1802, i, 366, 372, pl. 25; SPRENGEL, *Antiquitatum Bot. Specimen*, 4to., Lips., 1798; SMITH, *Exotic Botany*, 4to., London, 1804, pl. 31-32; DUPPA, *Illustrations of the Lotus of the Ancients and Tamara of India*, fol., London, 1816; SIBTHORP, *Flora Græca*, fol., London, 1806; and FÉE, *Flore de Virgile*, 8vo., Paris, 1826. It has been used so indiscriminately that the confusion, in which botanists find themselves involved when they attempt to decide what was the lotus of the ancients, may excuse discrepancies in the application of the word (by architects in England and on the continent) to ornament which is supposed to have been conventionally imitated by the Egyptian, the Assyrian, and the Greek, schools of decoration, from a plant that was once so called. It is remarkable that GIRAULT DE PRANGEY, *Essai sur l'arch. des Arabes*, etc., 8vo., Paris, 1841, p. 56, mentions that the leaves of the lotus were adopted at Cordova and afterwards introduced in all the decorations of the Moresque structures; but copies, more or less direct, of natural types by the Oriental nations are not here noticed beyond a general reference to OWEN JONES, *Grammar of Ornament*, fol., London, 1856, for examples that may possibly have been derived from the Indian *tamara*, the Chinese *lien-wha*, or the Indian *citambel*.

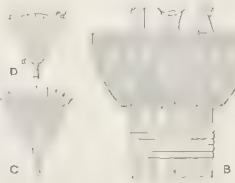
It was generally considered in England that all Egyptian capitals, which exhibited the usual form of a bell inverted, were properly to be designated lotus-capitals. The French archaeologists went further, making two classes, viz., the crateroid or fruit of the lotus, and the lotoid or calix of that plant. These respectively seem to be the bud and the blossom of the papyrus, according to WILKINSON, *Architecture of Ancient Egypt*, 8vo., London, 1850, who, seldom mentioning the lotus, applies that name, p. xxv, to the enormous bowl resembling an echinus or ovolo which supports the head of Isis in an example from Philæ given, fig. b below, from the large illustration in his pl. 13, figs. 4 and 5. At p. 7 he admits among the usual ornaments of a pillar, the lotus blossom, the papyrus head, water-plants, the palm tree, and the head of a goddess. This term "water-plants" occasions an obscurity of which he fully avails himself, p. xv and xvi, noticing the bud-capital, and the papyrus blossom, and mentioning "the volute ornament, which is taken from the other water-plant, emblematic of Upper Egypt, as the papyrus was of the lower country." Nowhere in that work does he intimate the specific name of "the other water-plant" which, as he states, p. 59, often forms the capitals of columns, supporting the canopy over a king's throne." Indeed, but for the direct assertion, p. 39, that his third order has "a capital formed of the bud of the papyrus", the reader might suppose that the bud or blossom of the lotus was the foundation of the *crateroid* capitals in his pl. 5-8, pp. xxi-xxiii. At p. 46 this author says, with regard to what he calls the fourth order of Egyptian columns, that it "is distinguished by its capital, which has been erroneously supposed to represent the lotus: the shape is like a bell, with the mouth upwards: in sculptures where the papyrus is figured, we find

the Egyptians gave to its flower the exact form of this capital; and there is no doubt that their intention was to represent the papyrus in this column: and if further proof were wanting, it may be found in the palace-temple of Remeses the Great at Thebes (usually called the Memnonium), and other monuments; where these columns have an indication of the triangular form of the papyrus stalk upon their shafts: an additional proof of the impropriety of designating this as the lotus (or 'full blown lotus') capital, is shown by the fact of columns having been found in a rock-tomb near Metáhara, as well as at Philæ, and Edfoo, with capitals actually representing the full blown lotus; and the accuracy with which the Egyptians always delineated that plant, suffices to prove" that the bell-shaped capital could not be intended for it. Also at p. 56 he says "among the columns of the corridors at Philæ, are some with the full-blown lotus capital which sufficiently show the impropriety of applying the name to those" of his fourth order. And p. 60, speaking of his seventh order, he says, "the full-blown lotus column is among the many varieties of this order, which is then without the addition of the Isis-head: the largest example of it is in the area of Edfoo; and though the temples where it is found are of Ptolemaic date, it was not a late invention."

In the section of the little hall at Karnac (fig. 3) the small and the large columns have capitals respectively imitating the bud and the blossom of the papyrus (not lotus) according to this author. A similar opinion is expressed in the *Grammar of Ornament*, plate 6, which describes the capitals to the small columns of the Memnonium as single buds of the papyrus; others of the temple at Luxor as each formed of eight buds of the papyrus; and the capital of the large columns of the same temple as the full-blown papyrus surrounded by papyri and lotus buds alternating. The latter is given in the *Illustrations*, 1859, s. v. Egyptian, fig. 4, where fig. 2 shows a similar capital with the omission of the papyrus as decoration. The capitals in a portico at Edfoo are described as ornamented with a collection of aquatic plants round a full-blown papyrus, an account which might be given of the three principal subjects from Esneh in the above-named plate of the *Illustrations*.

The *Grammar of Ornament* is the authority for the following illustrations of the lotus in nature and in art. It contains the method of colour applied by the Egyptians: and gives as instances of *really lotus* capitals an example which it describes as eight lotus flowers in two tiers, from the building in the oasis of Thebes, and another, here marked a, which it mentions as having sixteen lotus flowers bound together in three tiers, from the colonnade of the island of Philæ. Fig. c is the natural flower with outer leaves of green, and inner leaves of purple softening into yellow. Fig. b is the conventionalized form; it shows a, yellow with red bands; b, dark green outer leaves; c, light green inner leaves; d, red interior leaves; and e, with f, a yellow ground.

The name 'lotus' has also been applied in another manner. In the supplementary volume to STUART and REVETT, *Antiq. of Athens*, fol., Lond., 1830, the word 'honeysuckle' is applied to the palmette and its liliaceous companion on p. 55 of DONALDSON, *Description of Various Fragments*; who uses the name, p. 53, for the palmette or ornament usually called the honeysuckle; and, p. 54, for decorations which resemble, in



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effect, an ovolo carved on the rim of a vase, rather than a leaf. In the same volume KINNARD, *Athenian Sepulchral Marbles and other Ornaments*, p. 12, considers that the palmette originally referred to some portion of Oriental idolatry, and that the venerated object was probably the Gr. *κνῆπος* (a bean) supposed to be the still sacred plant of the east called *tamara*.

Examples of a questionable use of the name lotus occur in INWOOD, *Erechtheion*, fol., Lond., 1821, who, in the descriptions of the plates 12, 23 and 26, applies it to the ornament frequently found alternating in a band or frieze with the palmettes, as at Bassæ, at the Erechtheion, and at Priene, which is in those cases much thinner than in the two examples given in the plate above mentioned as contributed by DONALDSON. Even LAYARD, *Nineveh*, 8vo., Lond., 1849, ii, 295-8, marking the similarity between such ornaments in Assyrian and Greek work, says both have the honeysuckle alternate with the lotus or tulip, or whatever other name should be given to this other form of vegetation, which in his opinion was evidently introduced about the period B.C. 734 or 721 of the works at Khorsabad.

With reference to the plants above mentioned as being the lotus, it may be stated that the *nymphaea cœrulea*, citamabel, which has a green calyx, partly or entirely blue petals, and a yellow capsule, so closely resembles the plant represented (fig. n) in the Egyptian paintings, that it seems to have the best claim to the honour of being that lotus of which so much has been said, yet so little hitherto has been understood. 6. 14.

LOUDHAM or LUDHAM (THOMAS DE), is said by BROWNE, *History*, 4to., Lond., 1838-47, p. 126, to have been sworn into the office of master mason at York cathedral 8 February 1347; and to have been succeeded by T. de Patenham; this is not so stated in SURTESS SOCIETY, *Fabric Rolls*, 8vo., Durham, 1859, but on p. 163 (9 Jan. 1344) the name has the prefix 'dominus'; and on p. 166 is a reference to T. de Pacenham having held the office of master mason.

LOUIS (VICTOR), born 1735 at Paris, obtained an extra *grand prix*, and thereby was sent to Rome. He appears about 1760 to have taken his pupil Amoudru to Warsaw, where he made a design for a palace and received, before returning about 1763 to France, the title of royal architect from Augustus III king of Poland (1733-63.) Perhaps this visit may have led to the employment of Louis at Nancy and Lunéville, which were under the government of Stanislas Lecinski (titular king of Poland 1704-18, 1733-5) as duke of Lorraine and Bar from 1737 until his death 23 February 1766. Possibly also the design of the churches of S. Pierre at Besançon and of S. Eloi at Dunkirk, preceded the engagement of Louis to erect one of the two *salles de bal et festin* on the marriage 1770 of the dauphin with Marie Antoinette, as mentioned by BLONDEL, *Cours*, 8vo., Paris, 1771, ii, 273; this was perhaps the *circus* in the centre of the gardens of the palais royal; J. A. D. * * * *Lettre*, 8vo., Paris, 1787, with a plan, etc.: he continued the *vauxhall* commenced by Célérier; BLONDEL, ii, 290. He was nominated 1771 architect to the duke of Orleans; PUGIN, *Chancel Screens*, 4to., London, 1851, p. 53; and then was engaged to design the theatre (to hold 4000 persons) at Bordeaux; his drawings were signed 18 May 1773; his remuneration was fixed 25 July 1774 at 7½ per cent.; the edifice was first used 7 April 1780, having cost 2,436,523 livres; and he published a description of it as the *Salle de Spectacle de Bordeaux*, fol., Paris, 1782. In 1784 his petition for a pension was refused because colonnades and other decorations called useless had been executed to gratify his taste. While engaged on this book he appears to have been at Paris; for, when the duke of Orleans began his speculation of building the galleries round the garden of the palais-royal, Louis furnished 1781 the design and superintended the execution of so much of the work as was then done, including 1787 the théâtre des Variétés completed 1790 (wherein was introduced framing in iron for nearly the first time) and known after 1799 as the théâtre de la

Comédie Française, with a façade in the rue Richelieu: he also designed in that street the block of buildings containing the opera-house opened 1793; both of these theatres are shown in LEGRAND and LONDON, *Description*, 8vo., Paris, 1809, iii, 87-90, who notice the alteration by Moreau made about 1798-9 to the interior of the earlier one.

Louis seems to have settled at Bordeaux, where he designed the hôtel de la préfecture, the banque in the rue Esprit des Lois, and the maison Fonfrede in the *place* Richelieu. His influence and taste assisted in providing the fine streets and good houses which that town then acquired: but the speculation was stopped by the Revolution; and Louis, stripped of his fortune (he had given a dowry of 500,000 francs with one of his two daughters), quitted Bordeaux. A mass of drawings, which he left in the care of a friend, long remained unnoticed in a garret (*grenier*): they were sold 1846 for a small sum to the municipality, and are now preserved among its archives; some of the perspective views extend to the length of 18 ft.: thirteen large plates illustrating the construction of the theatre have been published by GAULHIER L'HARDY, *Portefeuille iconographique de V. Louis, précédé d'une notice architectonographique sur le grand théâtre de B.*, 8vo., Bordeaux, 1828. The date of his death has not been accurately ascertained; it is sometimes stated 1799 and 1800; the author last named presumes that he died in an hospital: to which DUSSEIX adds the date 7 March 1807: but it appears that Louis must have been alive 30 June 1810, because in an *arrêté* of that day he is named in the matter of the château Trompette at Bordeaux, whereas if then deceased his executors or other representatives would have been mentioned.

MARCELLIN, *Eloge de V. L.*, 8vo., Bord., 1834; VAUDOYER, *Lettre à Marcellin sur l'architecte Louis*, 8vo., Paris, 1837; MARIONNEAU, *Douze lettres de V. L.*, 16mo., Bord., 1858; DETCHEVERRY, *Hist. des Théâtres de B.*, 8vo., Bord., 1860; DUSSEIX, *Les Artistes Français*, 8vo., Paris, 1851. 112.

LOUIS XIII, XIV, XV, AND XVI (STYLES OF). An attempt to reconcile the examples of decoration that were executed under Louis XIV and XV, and the publications (in their reigns) of ornament, with statements made by early and late French writers as well as by some recent English historians of art, has been found an extremely difficult task. Even the best French authors on the subject seem to imply that external architecture, internal decoration, and ornamental detail, moved contemporaneously in the same school or manners in France from the Revival under Louis XII to the Restoration of Louis XVIII. On the contrary, an acquaintance with any one of the three gives to an English student little notion of the changes, in either of the others, during the seventeenth and eighteenth centuries: the independent course pursued, during that period, by the decorators and ornamentists has, perhaps, never been so fairly recognised any where as in the last paragraph of the article on FRENCH ARCHITECTURE, which has appeared in this Dictionary. But as the remarks therein contained refer to ornament more than to decoration, it is desirable to give a similar notice of the variation of internal embellishment from 1600 to 1800. Most of the necessary illustrations will be found in DARCEL and ROUYER, whose work on the subject, although the latest and the best, includes amongst other faults the error of grouping its examples by epochs of monarchs: such a proceeding is fallacious, because the styles overlap reigns and each other, and because there were more styles than reigns; for example, the *Style Louis Quinze* is only one of the "styles de Louis XV", a definition which must be carefully remembered.

A remedy for errors that occur in some English books of reference, probably through want of an authoritative list of the standards of taste in the matter under consideration, is offered in the following synopsis, which attempts to complete a combination of remarks collected from the French authorities mentioned at the end of this article, with views traditionally derived

from English ornamentists, and with the guides at present followed in such matters.

The styles under Louis XIII (1610-43, the regency of Marie de Médicis ending 1614) were three. 1; *La Seconde Renaissance*, commenced 1600 by the personal taste of Henry IV, and lasting till about 1625. 2; *The Style des Jésuites*, a transition to the next fashion, as seen in the church of S. Louis S. Paul erected at Paris 1627-40 by Martel Ange and decorated after 1630 by Jacques Sarrazin (1558-1660) who had studied for nearly twenty years the works of Buonarroti. 3; The real STYLE LOUIS TREIZE, about 1625-50, a French version of Italian art; it was the school which educated Jean le Pautre 1617-82) the ornamentist, of the next reign, whose name in England is better known than that of any other decorator who flourished at the time.

The styles under Louis XIV (1643-1715, the regency of Anne d'Autriche ending 1651) were six. 1; *The Style de la Régence*; it was the moderate commencement, used about 1650-65, of the "grand style de Louis XIV." 2. *The Style Le Pautre*, about 1640-80; which is the real STYLE LOUIS QUATORZE. 3; After the cupids of Le Pautre, came the *grand style de Louis XIV*, preceding the sphinxes of Berain: this style, as exhibited under Charles Le Brun (ob. 1690) in the ceiling of the galerie d'Apollon at the Louvre 1662-80, and afterwards at Versailles, was really an exaggeration of the "style Le Pautre," and was not continued after 1710 in the completion of the royal works at Versailles. *The Style Berain*, so called from the designer Louis Berain (1636-1711), might also be called the "Buhl style" if the celebrated cabinet-maker A. C. Boule (1642-1732) had not followed the changing tastes of the times; it is the meagre termination of the "grand style de Louis XIV." 5; Before the death of Louis XIV, "towards the end of the seventeenth century, however, a new style commenced to develop itself—the Louis Quatorze" as it has been erroneously termed at one of our museums; this is the *Style Maintenon*, the transition to the "style Louis Quinze." 6; *The Style Watteau*, continuing the passage. The difference between the fashions in 1691 and 1710 is amply shown by the illustrations to the editions published in those years of AVILER, *Cours d'Architecture*.

The styles under Louis XV (1715-74, the regency of Philippe d'Orléans ending 1723) were eight: six of them are usually and derisively taken in the aggregate as the "style perruque" that lasted 1685-1785, and is erroneously called "the style known as Louis XIV or rococo" by an eminent author, who regards it as French by origin, and as "the only style—that has been invented since the renaissance;" he gives as an example the Cabinet des Médailles at Versailles, which is dated by DARCEL about 1735, but seems to be nearer 1705. 1; *The Style Maintenon*, about 1685-1725. 2; *The Style Watteau*, named after the decorative painter Antoine Watteau (1684-1721), dating about 1705-25 or later. 3; *The Style rocaille*, which was introduced about 1715 by the architect G. M. Ordonnoir called the "père du genre rocaille", it lasted till 1745. 4; The real STYLE LOUIS QUINZE, a modification of his extravagancies by the best French architects 1725-45, as shown in the plates to the edition 1738 of AVILER. 5; The French attempt to imitate Chinese art, dating about 1740-50; it is properly a *style baroque*. 6; *The Style Pompadour*, 1745-65, a name that has been improperly given to those here numbered 2 and 3, as well as to the following fashion. 7; *The Style Dubarri*, 1769-74. These two last phases are properly termed *rococo*, a name which has been extended to all the five previous forms. 8; The immature "style de Louis XVI", inaugurated about 1750 by Soufflot, which is regarded as *La Troisième Renaissance*; representations of it are given in some of the plates of BLONDEL, *Cours*, 8vo., Paris, 1777.

The styles under Louis XVI (1774-92) were two. 1; *La Troisième Renaissance*, which dates about 1750-80. 2; The real STYLE LOUIS SEIZE, about 1775-90: it was the school in

which were educated Louis David (1748-1825), P. F. C. Fontaine, and C. Percier. A few words will suffice to intimate that its phase under the Republic is known as the *Style Messidor*; and that the fashion under Napoleon I, the *Style de l'Empire*, was the Greco-Italian idea of Percier and Fontaine; they completed the third renaissance of architectural art in France by the last of the original schools of French decoration; with it (and not, as sometimes taught in England, with the "rococo") the thread of the historic styles is completely run out.

AVILER, *Cours*, 4to., Paris, 1691; 1696-93; 1710; 1738; 1760: VAUDoyer, *Etudes*, 8vo., Paris, 1850; WORNUM, *Catalogue of Ornamental Casts*, 8vo., London, 1854; FERCUSSON, *History*, 8vo., London, 1862; DARCEL and ROUYER, *L'Art Architectural en France*, 4to., Paris, 1866. *Illustrations of these variations of style are under consideration.* J. W. P.

LOUVIE in France; (misplaced s. v.) LONVIE.

LOUVRE, formerly written LOOVER, and LOVER, and also called FUMERALL (It. *fumaiuolo*; Fr. *fumerelle*; Ger. *rauchloch*). This term, derived from the French *ouvert*, open, is applied to a sort of turret placed on the ridge of the roof of a hall, kitchen, or other large room, formerly for the escape of smoke and now for ventilation (*Detached Essay*, Heat, p. 2). The sides are formed of boards sloping outwards with intervals between them so as to admit a free current of air, and prevent the admission of wet. When the sides are glazed for admitting light, this structure is called a LANTERN. DALLAWAY, *Discourses*, 8vo., London, 1833, p. 174. Louvres are sometimes used in the present day for the ventilation of warehouses and workshops where the free admission of air will not spoil the goods: also for schools and crowded rooms. A simple apparatus for regulating the escape of heated air, is shown in LA PROPRIÉTÉ *Journal*, 4to., Paris, 1834, pl. 16.

At Eltham hall, the louvre occupied the third division from the upper end. An example 1435 occurs at Lincoln college, Oxford, (GLOSSARY); also at Wadham college; Lambeth palace, temp. Charles II; Westminster hall, rebuilt; Westminster school; Trinity college, Cambridge; and the Abbot's kitchen, Glastonbury. One is given from a building opposite the town hall at Cologne, in the *BUILDER Journal*, 1847, iii, v.

LOUVRE, LOUVER, or LUFFER, BOARD (Fr. *abat-son*). One of the boards used for the purpose explained in the preceding article. Such boards are also fixed in the sides of the openings of belfry windows to let out the sound of the bells. The edges are sometimes cut to certain forms and the board itself sometimes pierced for ornament. Broad slabs of slate or of metal are occasionally substituted for boards. VIOLLET LE DUC, *Dict.*, s. v. remarks that the earliest instance of such a board occurring in manuscripts is of the fifteenth century. LEVER BOARDS are those which are made to move up and down. COVER.

LOVELACE MARBLE, see BROTHERSDEN MARBLE.

LOVEN or LEUVEN (Engl. and Fr. Louvain; Ger. Löwen). A town in the province of Brabant in Belgium. A deep ditch and an earthen rampart from 80 to 100 ft. high, which nearly form a circle of two miles in diameter, are the only remains of the fortifications; except a lofty round tower begun 1364, but finished 1462-9 by M. Layens (shown in SCHAYES, *Histoire*, 12mo., Brussels, 1850, iv, 114), and the *porte de Diest* 1526, which was merely a gateway in the curtain between two half-round towers until 1820, when a new roof and two brick wings were added to convert it into a prison. Though the streets are regular, the houses are indifferently built, and the whole town has a dull appearance: in the rue de Namur are two old houses (given in SCHAYES, iv, 93); one was formerly the collège de la Haute Colline; the other much defaced since 1845 now serves as the town school: there are several others near the branch called la Leye, of the river Dyle.

The collegiate church (or cathedral as it is called), dedicated to S. Pierre, was commenced 1430 to be rebuilt on the plan of a Latin cross, 296 ft. long and 75 ft. wide; in 1433 the

choir was in hand: it has a great similarity to the church of Ste. Waudru at Mons. In 1459 the foundations of two new west towers were laid, but the works were soon suspended: in 1507 a design was made to replace them by a new west façade of a centre tower and open work spire 535 ft. (ancient measure) high and two side ones 430 ft. high; the works were discontinued when they had reached the fourth stage: two upper stories of the towers and a temporary timber spire in the centre, were 1604 blown down in a storm. This front, with its carved timber *portail*, was restored 1859 by M. Lavergne. A drawing on vellum dated 1507, 9 ft. high and 2 ft. 9 ins. wide, coarsely but carefully executed, exists in the town hall, and shows almost every detail of the proposed towers and *portail*; also a model in Avesnes stone, 24 ft. high and 7 ft., 6 ins. wide at the base; the former was probably, the latter certainly, executed by Josse Metsys aided by the sculptor J. Beyaert; the model completed 1524 was restored 1829 by G. Goyers. The timber cupola at the cross, containing the chimes, was erected 1730. The interior has a triforium and clearstory of good design; also a remarkable stone *jube* or rood screen at the chancel arch, cir. 1440; and a twelve branched chandelier of wrought iron, by J. Metsys cir. 1500, formerly in the chapel of *Onze lieve Vrouwe daerbuiten* founded 1372 outside the town and demolished cir. 1795. The eagle lectern, the cantors stools, and two brass coronæ, were sold about 1839 and are now in the collegiate chapel of S. Mary Oscott, near Birmingham. The stone tabernacle, considered the finest in Belgium, about 46 ft. high was designed 1450 by M. de Layens. The pulpit was carved 1742 by Bergé for the Norbertine abbey of Ninove and brought here 1807, it is in the form of a rock and 33 ft. high. The throne is by G. Goyers. The bronze sixfoiled font on seven shafts had formerly a pyramidal cover now lost, the ornamented iron crane for moving it was made 1505 by J. Metsys (NOTES and QUERIES Journal, 3rd ser., vi, 476); it is given in *Illustrations*, 1859, pt. 2, and in GAILHABAUD, *L'Architecture*, 4to., Paris, 1856, iv. The altar tomb of blue stone of duke Henry I, who died 5 Sept. 1236 at Cologne, was restored 1859 by M. Lavergne: another altar tomb bearing effigies of his wife Matilda of Flanders and her daughter Mary, wife of emperor Otho IV, who died 1260, also deserves notice.

The church of Ste. Gertrude, formerly belonging to a monastery of Augustinian canons made an abbey 1449 and demolished 1822, has a nave and south aisle dating from the fifteenth century; a choir built 1514-26; a north chapel 1560; and a west tower 1453-55 with a crocketed stone open-work steeple flanked by four angle turrets: the tower, being repaired 1847, has a modern parapet. The oak double stalls of the fifteenth century "properly returned", in the choir, probably by J. Beyaert, were carefully restored cir. 1848 by G. Goyers and sons; the canopy is modern. The church of Notre Dame, formerly belonging to the monastery of the Dominicans (demolished 1797), was built by Henry III of Brabant 1230-56; it is in the First Pointed style; the choir with pentagonal apse was rebuilt in the fifteenth century: it is a three-aisled church 180 ft. long and 92 ft. wide, with twelve thick piers to which Doric capitals were added in the eighteenth century. The church of S. Jacques aux Jones (*Ter Beist*) a three-aisled cruciform building founded cir. 1200, made a parochial church 1252, was almost entirely burnt 1350 with the exception of the tower, and was soon rebuilt. The tabernacle with a brass balustrade dating 1467 is probably by J. Velder.

The church of the Grand Béguinage erected 1305 is a three-aisled building 107 ft. long and 98 ft. 6 ins. wide, with twelve remarkably slender piers, necessarily strengthened by iron bars; each aisle was partly rebuilt 1547, and the vaulting in the seventeenth century. The stained glass of each window is old; there are some good tombs. The church of S. Quentin, rebuilt in the fifteenth century, has three aisles. The church of S. Michel erected 1650-66 by G. Hesius, but generally attributed to L. Fayd'herbe, is a three aisled cruciform classic building with

semicircular apsidal terminations to the choir and transept; until 1778 it belonged to the Jesuits. It contains carved confessionals, and an organ case; the latter formerly belonged to the abbey of Herckenrode. Notre Dame de Fièvre built 1705, has an octagonal dome resting on a drum carried by eight Doric columns with arches standing free from the brick external walls so as to leave a continuous aisle all round.

The old hôtel de ville (now the council chamber, offices, etc.), was designed by S. van Vorst, and the first stone laid 31 March 1439, as he died 19 Sept. it was completed in August 1442 by Jan Keldermans; it has been completely modernised. The present hôtel de ville in the Flamboyant style, one of the most elaborately decorated structures on the continent, was designed by M. de Layens, master mason to the city; the first stone was laid 29 March 1448, the exterior completed 1459 or 1463 and the interior 1467, at an expense of 32,786 florins. The building forms a rectangle 113 ft. 6 ins. long, and 41 ft. 9 ins. deep; the façade, 73 ft. 3 ins. high, is pierced by three rows of windows, between which are canopied niches holding figures designed by H. Stuerbout. The roof is of a very high pitch, finished with a gable at each end having octagonal towers of open work at the angles and two other loftier ones in the centre: in 1828 D. Everaerts commenced the careful restoration of the building, and it has cost 224,540 frs.; the six turrets, pinnacles, niches and carved work are all new; the decayed brackets of a spongy stone from the quarries of Avesnes, are replaced by copies by G. Goyers in stone from Hordain in France; the character of the faces and draperies is said to have been changed; the two hundred and eighty-two niches are being filled with statues of celebrated people connected with the town; in 1859 eighteen or more were put up. A double external stone staircase 1709 leads to the *salle des pas perdus*, which has an oak roof resting on corbels carved 1449 by W. Ards. The porter's rooms on one side of the platform were built 1460; the vaulting of the treasury on the other side has bas-reliefs in Avesnes stone carved 1469 by J. Beyaert; the windows were protected by wrought iron railings 1449 by G. van Dueringen, which are now placed in the granary above. The *salle du mariage* and a small one adjoining have also oak roofs and carvings by J. Beyaert. F. G. STEPHENS, *Flemish Relics*, 4to., London, 1866, p. 151, gives a good photograph: PENNY MAGAZINE, 4to., London, 1834, iii, 12.

The university founded 1426 by duke John IV, reestablished 1817 or 1826, has been since 1836 called the *université catholique*, being used solely by the Belgian R. C. priesthood; it now educates about 600 students. The *collège* van Daele was founded 1569; that of the Trinity 1657; and the *pédagogie* du château 1682. The college of the Holy Ghost founded 1442, rebuilt 1720, has a large chapel and a portal with Corinthian columns: that of Luxemburg, and that of the Premonstratensians, were rebuilt 1755; that of Villers dates 1760; the *salle des Promotions* called Ficm 1766; the college of Driutius is a large quadrilateral building 1775 with a stone gateway; that of the pope, founded 1522 by Adrian VI, was rebuilt 1776 by Montoyer. The king's college dates from 1782. The *pédagogie* du Faucon 1783, by C. A. Fisco, resembles in plan and style of decoration the Luxemburg palace at Paris, and though incomplete is the finest of all; it is now used as a military hospital. The library 1723 has 105,000 vols.; the museum was founded 1840: the theatre of anatomy 1744, is octangular, and built of brick and stucco. The tower of Jansenius, given in GRANVILLE, *St. Petersburg*, 8vo., Lond., 1835, p. 68, is now pulled down. The *halle aux draps* founded 1317 has at one corner the inscription:—

Mest. Jan Stevens en mest. Art. Hare en mest. Gort. Raes: dese dry mestere begonste dese halle in't jaer ons Heere mccccxij s'maendags na bevolke paeschen; SCHAYES, iv, 25.

which is supposed to give the names of architects; but they were perhaps only the officers of the society. This edifice is 200 ft. long by 50 ft. wide, isolated on three sides and incom-

plete. In 1426 duke John IV appropriated it to the university, and it now serves as the schools of law, medicine, and theology: in 1680 a second story was added in a modern style which superseded the curious workshop roofs shown in SCHAYES, iii, 26: the hall is supported by large cylindrical columns. The brewer's guildhall, opposite the hôtel de ville, is a good building in the Renaissance style. The hospital of S. Peter, founded 1080, was rebuilt 1256; a small portion of this date with a three-ailed church, cloister, and oratory of the fifteenth century still exist: a large and commodious hospital of red brick designed by — van Arenburg 1839-56 has been built adjoining it. The *salle de Frascati* 1806 by C. A. Fisco is considered one of the best in Belgium. A new cellular prison was being constructed 1859 near the railway.

WEALE, *Handbook to Belgium*, 8vo., London, 1859; WAUTERS, *Belgique*, 8vo., Brux., 1846, p. 63-75, gives a view of the hôtel de ville, and the tabernacle and jubé in S. Peter's; GODWIN, *Buildings in Belgium*, in the CIVIL ENGINEER, etc., *Journal*, vi, 34; STAPPAERTS, *Belgique Monumentale*, 8vo., Bruxelles, 1844, p. 229. 28, 50.

LOWE. A term used in the north of England for a small eminence on a plain: the word is contrasted with 'holt', which means a peaked hill covered with wood. ARCHÆOLOGIA, 1814, xvii, 151.

LOWES. The name used in early mediæval accounts for the LEWIS.

LOWE'S PATENT STENCH TRAP. A clever and simple contrivance, combining in a square cast-iron box, a grating for a street, yard, or house-drain, and a trap by which all stench or smell is effectually prevented from rising from the drain over which it is placed, or from the refuse which has passed into the drain. The grating is fitted with a hinge that admits of its being raised to inspect or cleanse the trap; the price is one half that of any ordinary apparatus. The patentee was Mr. Lowe of Salford, where the invention was in general use; ARCHITECT *Journal*, 1849, i, 424.

LOWKYNG. A term formerly used in the north of England for the weeding or thinning of young timber trees; but now generally for the weeding of corn; SURTEES SOCIETY, *Finchale Priory*, 8vo., Newcastle, 1837, p. 436.

LOW PRESSURE HEATING APPARATUS. The heating apparatus in which pipes of about 3 ins. diameter are used, and the water self-supplied to the boiler. The greatest heat that can be obtained is, therefore, only that of boiling water, thus differing materially from the high pressure or PERKINS'S system. HEAT, p. 16, 20, in *Detached Essay*.

LOWRYNG CASEMENT. A term used by William of Worcester, for a 'hollow', in the description of the moldings worked in the west doorway of Redclyff church, Bristol, as noticed by WILLIS, *Nomenclature*, 4to., Cambridge, 1844; who writes that "the present state of the original makes it impossible to discover what peculiarity of contour entitled it to such an epithet."

LOW SIDE WINDOW. An aperture found either towards the western end of a chancel, on one or on both sides, or in some part of the nave or aisle, placed within a short distance of the ground, so that in most cases the head of it does not rise much higher than the sill of the other windows; it is sometimes a double or treble light aperture. Examples occur in the very rude early structures of Guernsey and Jersey: the instance at Caistor church near Peterborough, shows long-and-short work in the jambs: and a few specimens are found of the Norman period; as at Christon, Somersetshire, almost close to the ground; S. Margaret-at-Cliff, Kent; North Hinksey, Berkshire; and S. Giles in Northampton: but the majority must be assigned to the thirteenth and fourteenth centuries, though the use of it may be traced down to the eve of the Reformation. The examples exhibit every variety of form; sometimes being of a plain oblong shape, the edges chamfered on the outside; sometimes resembling single light windows either plain

or cusped, and partaking of the architectural characteristics of the period to which they belong; sometimes the westernmost window on one or both sides of the chancel has its sill lowered to within a very short distance of the ground, and a transom run across the window at about the height of the sill of the other windows. This aperture is generally found blocked up with masonry. In no instance can it be proved to have been originally glazed; it seems to have been sometimes fenced by an iron grating on the outside, and closed by an oaken shutter (still remaining in many instances) on hinges within, the hooks for which are very often seen. The sill of this opening on the inside was sometimes adapted for a seat and desk, as at Elsfield, Oxfordshire, and at Allington, Wiltshire. Sometimes two of these windows occur on each side of the chancel; or two on one side, in which case one will generally be found of later date than the other, and in general when found in early walls and under early windows, they appear to be insertions of later date. Where this aperture occurs in other parts of the church it has been remarked that it is generally near a chantry altar, and squints or HAGIOSCOPES very often terminate near this window in such a manner as to command a view of the chantry altar from it. The ECCLESIOLOGIST *Journal*, 1847, vii, 70, notices that it was, as often as not, rather turned from, than to, the high altar.

An aperture occurs in the Sainte Chapelle at Paris (1248) on the upper floor, perhaps the only example observed in France: this building is supposed to have furnished the model for prior Crauden's chapel at Ely (cir. 1325); S. Stephen's at Westminster; and Lincoln's-inn chapel, and Ely chapel, both at London; all upper rooms each having an aperture: one also occurs in the chapel (cir. 1260) attached to the solar or upper chamber at Little Wenham-hall, near Hadleigh, in Suffolk. These vary from about 10 to 15 ft. in height from the ground outside, and are very near to the floor inside. The only example that has yet been found in connexion with domestic architecture, is at Sutton Courtenay, Berkshire, of the fourteenth century, where under one of the windows of the hall is a square opening filled with Decorated tracery: one in the hall at Cheetham's hospital, Manchester, is called the *dole* window; nearly the whole of the monastery to which this hall belonged remains perfect. One perhaps of the most curious and interesting examples exists in the church of S. Mary at Othery near Bridgewater, where, in the usual place in the chancel is a two-light window of late fifteenth century date, one light has a transom and the part below it opens with a shutter and is fenced by a grating on the outside: a buttress having been built later in a diagonal line, so as to screen this aperture, the part opposite the aperture is pierced by an oblong opening, so as to admit a direct view or communication from the window through the buttress.

Various hypotheses for the use of this aperture have been put forward; these will be found stated and condemned in DURANDUS, *Symbolism of Churches*, edited by NEALE and WEBB, 8vo., Leeds, 1843; ECCLESIOLOGIST *Journal*, 1846, v, 165, 187: 1847, vii, 65-74, 101, 142: by STREET, 1848, viii, 288; ix, 113, 187, 252, 348; (and BUILDER *Journal*, 1858, xi, 481) and 1850, xi, 92: LOWE, *On Low Side Windows*, printed in ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., Lincoln, 1850, i, 110-21: in the ARCHÆOLOGICAL JOURNAL of the Institute, 1847, iv, 314-26, by PARKER; and 1854, xi, 33-7, by ROGERS, who describes five examples near the Lizard Point in Cornwall. ROCK, *Church of our Fathers*, 8vo., Lond., 1849-53, iii, pt. i, 114-24, considers it to have been an "Ankret's window", and also used for other purposes. NOTES AND QUERIES *Journal*, 1868, 4th ser., i, 364, 488, 543, 586, 618.

Such an opening has in consequence been called by the following various names:—*Exterior confessional*, for which theory is quoted an account by T. Bedyl to the monks of Syon 1534, printed by the CAMDEN SOCIETY, *Three chapters of Letters relating to the suppression of Monasteries*, edit. by T. Wright, 4to., London, 1843, from the MS. Cott. Cleop. E. iv, fo. 109,

in the British Museum: *Dole window*, for the distribution of alms; three openings in the wall between the north transept and porch of S. Mary's church, Bridgewater, are still used for distributing dole to persons standing in the porch, the almoner being in the transept: "*Eucharist window*" by STREET, in *ECCELESIOLOGIST Journal* (as above) for lepers, Jews, and other persons out of the pale of the church; he refers to a fresco painting in Eton College chapel; a low narrow window in the chancel of Bibury church, Gloucestershire, is still called "the lepers' window": *Lychnoscope* (cir. 1838) by the CAMBRIDGE CAMDEN SOCIETY, *Few Hints on Ecclesiastical Antiquities*, 4th edit., 8vo., Cambridge, 1843: *Offertory window*, in PALEY, *Manual*, 1846, p. 241: *Vulne window* as the symbolical representation of the wound in the Saviour's side, urged in the *ECCELESIOLOGIST Journal*, 1846, v, 165: and *Anker window* as suggested by E. E. in the same *Journal*, 1858, xix, 86 (150-4; 310), quoting from GRAVES and PRIM, *History*, etc., of S. Canice, Kilkenny, 4to., Dublin, 1857, p. 68; as well as by ROCK in his book above named, who (in addition) considers this aperture to have been used by lepers to hear mass through: also as a place for placing a light to scare away evil spirits from the churchyard, as criticised in the *ARCHÆOLOGICAL Journal*, 1848, v, 228. VIOLET LE DUC suggests that the opening in the Ste. Chapelle was to afford light to the reader of the lessons. NEALE and WEBB (1843) with J. J. COLE (1848) consider that it was the window out of which the sacristan rang the sanctus bell at the moment of the manifestation of the host, as urged in the Constitutions of 1281: and that it was placed on the south side of the church as nearest to the houses, (at Kirton S. Andrew, Lincolnshire; Bradfield, Berkshire; and Westhampnet, Sussex, the opening is on the north side); "with this explanation", writes Mr. Cole, "the use of the sancte bell, often found suspended in a small niche at the east end of the nave, is either preceded or superseded; the bell gable is generally of a later period of architecture than the low side window, and may therefore have superseded it"; but this point requires further attention. A writer in NOTES and QUERIES *Journal*, 4th ser., 489, states "he has never noticed both in the same building": this theory is also supported in the same *Journal*, p. 586, in an interesting extract from NICHOLS, *Narratives of the Days of the Reformation*, printed for the CAMDEN SOCIETY, 4to., London, 1859. F. P. LOWE suggests it was intended for ventilation, the opening in Winchester College chapel, and that in Othry church, being prominent examples; this is supported by J. V., in *BUILDER Journal*, 1858, xvi, 506.

Besides the examples incidentally named in the above text, those following have been most frequently mentioned. At Melton Mowbray church, Leicestershire, in the galilee porch, are four openings, never glazed, but they are grated, have shutters, and are not high from the ground; these may have been used by lepers, as a hospital existed near: *ECCELESIOLOGIST Journal*, 1849, ix, 115: ASSOCIATED SOCIETIES, *Reports and Papers*, 1865, viii, p. lvi; *BUILDER Journal*, 1856, xiv, 531. An aperture in Buckland church, Hertfordshire, having the splayed niche decorated, is described in *BUILDER Journal*, 1854, xii, 453, 478. At Liskeard church, Cornwall, at the west end of the south aisle, is an opening of three narrow loops under one arch with a stoup under them on the outside; in old times there was an hospital for lepers near the church. A window in a somewhat similar position, but without the stoup, exists at the church of S. Sennen near the Land's End; *BUILDING NEWS Journal*, 1859, v, 400. This example is also fully noticed by STREET, in *ECCELESIOLOGIST Journal*, 1849, ix, 115, which 314 mentions that at Ludlow church, Shropshire, there is a Third Pointed reredos, behind which "is a small chamber with a sort of lychnoscopic window." Another opening exists in the chapel of Needham Market, Suffolk. Bucknell church, Oxfordshire, is stated to have three openings.

An opening of a similar character to the low-side aperture, has been observed in a high position, as at Winchester College

chapel, where one of the lights of a three-light window on the south side near the screen, is divided by a transom, and is about 10 ft. from the ground both within and without. At Addlethorpe church, near Skegness in Lincolnshire, in the east end of the clearstory on each side of the building is an oblong aperture. A broad trefoiled light about 11 ft. from the ground occurs in the south side of the Middle Pointed chancel at Plympton S. Maurice, Devonshire. The use of openings placed so high has not been explained.

Illustrations are given in BRANDON, *Analysis*, 4to., London, 1847, of the north light at Westhampnet, Sussex (cut on p. 33); and at Raydon, Suffolk, (Early English, pl. 8). BRANDON, *Parish Churches*, 8vo., London, 1848, p. 15, shows Temple Balsall, Warwickshire; p. 59, Aldwinckle church, Northamptonshire; and p. 63, Bishop's Lydeard church, Somersetshire, where the wall of the south chapel is partly splayed as if not to block up the opening or view from it. The *Guide to the Architectural Antiquities in the Neighbourhood of Oxford*, 8vo., Oxford, 1846, p. 194, gives the interior and exterior of that at Elsfield. The *Journal of the Archaeological Institute*, 1847, iv, 314-26, shows Bucknell; North Hinksey; S. Giles, Northampton; Elsfield; Raydon; Over; Somerton; Whitwell; Garsington; Ardley; Ely; Blisworth; and Othry; besides giving a list of others: 1854, xi, 33-7, Mawgan in Cornwall: and 1848, v, 314, the example at Sutton Courtenay, as likewise TURNER and PARKER, *Domestic Architecture*, 8vo., Oxford, 1853, ii, 273. PALEY, *Manual of Gothic Architecture*, 12mo., Lond., 1846, p. 241, gives Oakington; Uffington; and Hartley in Kent. A list of many to be seen in Lincolnshire, Rutlandshire, and Northamptonshire, is given in the paper by LOWE, p. 111, from which much of this article has been derived. *Illustrations* are under consideration.

In Scotland, at Crichton church, Edinburghshire, "are two windows answering in some degree to the window frequently found in the chancels of English churches. Here they are situated respectively under the south-east and north-east lights of the choir, the cill of the former being elevated only a few inches above the ground. They are merely low square-headed apertures with a wide and deep internal splay and steep sloping cill"; MUIR, *Notices of some Churches of Scotland*, 8vo., Lond., 1848, p. 39.

NEALE, *On some Danish Lychnoscopes*, in the *ECCELESIOLOGIST Journal*, 1852, xiii, 215. WEBB, *Continental Ecclesiology*, 8vo., London, 1848, p. xvi, states that though this aperture "is common in England, it is but only hypothetically introduced into Foreign Ecclesiology", and notices, pp. 57, 110, 192, only three examples, one at Heisterbach abbey, one at Nuremberg, and another near Lecco. He mentions, p. 378, and 460, some peculiar gratings at Ossaja near Cortona, and in Sta. Chiara, at Assisi. The use of the examples in the Tyrol and Upper Italy above noticed, is probably explained by SEYMOUR, *Pilgrimage to Rome*, 8vo., London, 1848, p. 391, as quoted in the *ECCELESIOLOGIST Journal*, 1849, ix, 189.

LOYDI, or LOYTI, or LOIDI (HERNANDO DE), began about 1606 the church of the Franciscan nunnery of the Conception at Eybar in Guipuzcoa, after the design made by M. de Aramburu; he designed 1602 the transept, presbytery, and high altar of the parish church in that town, but its books say that he died 1603, after which it was continued until 1617 by M. de Garayzabal. AROSTEGUI (J. de). 66.

LOYER (TOUSSAINT), born 18 April 1724 at Rouen, worked with his friend Soufflot at Lyon, where he constructed many edifices; and was a member of the academy there. He died 1 November 1807. COCHET, *Notice*, 8vo., Lyon, 1808.

LOYSON (. . .), see LOISON.

LOZEN. A term used in Scotland for a pane of glass; SCOTS MAGAZINE, 1804, lxvi, 14.

LOZINGA, or LOSINGA; see HERBERT (R. and W.).

LOZENGE (It. *ammandorlato*; Fr. *losange*). The form which results from drawing two equal isosceles triangles on a

base common to both; it is a very usual basis of ornament. CHECKER. DIAMOND.

The heraldic bearing called a lozenge was derived from a quarry of glass called in France by the same name; and in the *ENCYCLOPÆDIA METROPOLITANA s. v. Heraldry*, it is stated that "all authorities are agreed that the height and breadth of the true lozenge must be as 5 to 4. This is the form of the diamond on playing cards. The proportion of the arches in the mosques at Cairo is 8 span to 5 rise, like the base and height of the pyramid; the Crusaders copied it and made it the standard one of Early French Gothic if not of the first Gothic everywhere: and the First Pointed window heads regulated the proportion of the glazing quarries, as these were made to fit into the angle of the two chords drawn from the point of the arch to its springings;" as stated by GARBETT, in *BUILDER Journal*, 1866, xxiv, p. 152.

A curious example of lozenge work in a wall of the passage to the crypt at Canterbury cathedral, is given in WILLIS, *History*, 8vo., Oxford, 1845, p. 87, fig. 30.

LOZENGE MOLDING or LOZENGE FRET. An ornament used in Norman Architecture presenting the appearance of diagonal ribs inclosing diamond-shaped panels; that at Tickencote, Rutlandshire; an "enriched lozenge" at Montivilliers in Normandy; two examples of lozenges of Early Norman work cir. 1120, from the remains of Old Sarum, and the wall of the north gate of the close at Salisbury, are given in the *Glossary*, pl. 113; pl. 115; with two others from Deeping S. James, Lincolnshire; and Walmer, Kent. 17.

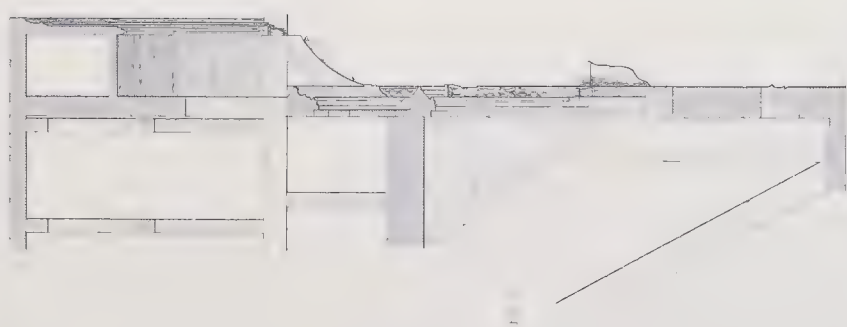
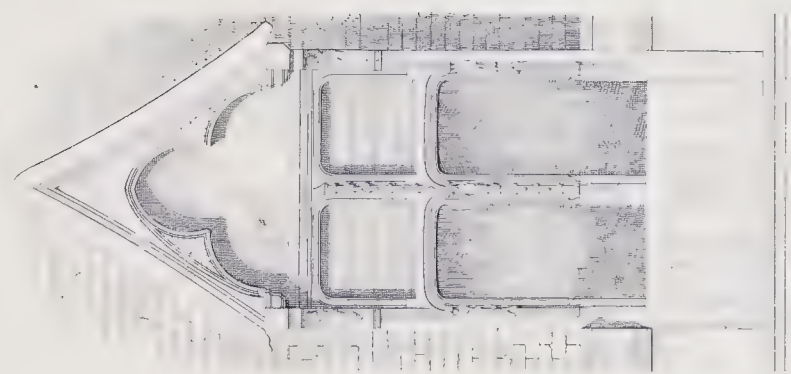
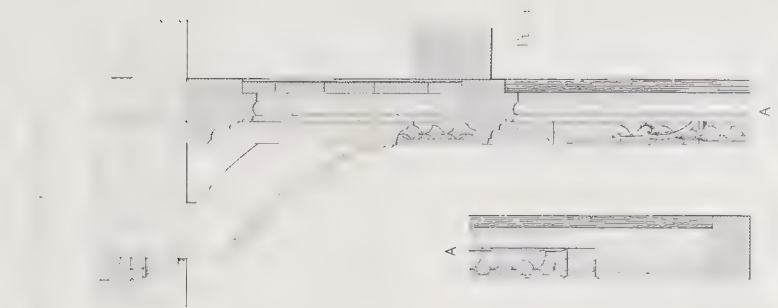
LUBECK or LÜNEK. One of the four Hanse towns of Germany (declared free early in the thirteenth century), situated on a slight ridge of land between, and at, the confluence of the river Wackenitz with the navigable Trave, over which there are four bridges. It was founded 1140. The walls and bastions have been partly destroyed and the enormous mounds which formed the ramparts have been converted into promenades; but the town is still entered by four gates; the *Holsteiner thor* dating about 1477, approached from a bridge, has two large round towers four stages high surmounted by steep pyramidal slated roofs joined by a body over the gate; it is given by DEMIDOFF. The *Burg thor* is square, six stages in height, covered with traceried arcades throughout; it is given by NESBITT pl. 8, p. 105, who considers both towers to be of the same date as the east façade of the *rath haus*. The town is regularly built, and intersected by several broad and straight streets, which have numerous gable-ended houses, many of them richly decorated, forming good specimens of the fifteenth and sixteenth centuries. One of the rooms of No. 194 Schlüsselbuden strasse contains curious well executed wood carvings. The churches, *rath haus*, hospitals, and gateways, among the best in Europe, are built almost entirely of a deep red colored brick, more or less molded, relieved very little by stone, but contrasted with the green tint of the copper-covering to the spires of almost all the churches. The see of the bishopric of Oldenburg founded 952 was transferred 1163 to Lubeck.

The *dom* or cathedral, dedicated to SS. John the Baptist and Nicolas, one of the largest churches of the North of Europe, was commenced 1170, the choir dates 1335 (or 1317-41); of the first date are the lower portion of the west front and the main arcades. The large north porch of brick is an addition of the early part of the thirteenth century; 1266-76 according to VON QUAST. The interior dimensions are 410 ft. long, and 80 ft. wide with chapels beyond, the nave and aisles are all 68 ft. high. The west front has two great towers surmounted by modern spires 416 ft. high, or 391 ft. according to FOWLER. (The larger dimensions given in this article are Hamburg feet; those by FOWLER and KING are English feet). The choir screen is regarded as one of the best specimens of early German wood carving. The west side of the cloisters has a double walk. A stone pulpit 1568, and a brass font 1455, are of excellent workmanship. The large and elaborate brass of

bishops Burchard I. von Serken (1276-1317), and Johannes IV. von Mul (1341-50), with details, is given in MILDE; it is noticed as 12 ft. by 6 ft. 6 in., and of Flemish workmanship, by CHRISTOPHER, in *ARCHÆOLOGICAL JOURNAL*, xvii, 167; ix, 294; and has been photographed by Bedford: SCHLOSSER gives pl. 20, the brass 1464 to the Lüneburg family: fifteen plates are given in KING, with the roodloft, cross, and beam, candlebrum, tombs, brasses, etc. The extent of clear floor in this and in the following church exceeds that in the cathedral at Vienna; they respectively stand ninth and tenth in the list of the German large churches.

The Marienkirche, 1276-1304 KING, or 1320, (or 1250-1360) has three aisles and chapels beyond, dating as late as 1479, of which the *briefkapelle* on the south side is a very elaborate specimen of brickwork; the vaulting is supported by two octagon polished granite shafts 14 in. diameter and 38 ft. high; the molded jambs of the doorway are also in granite, which material is used generally for the plinths of all the churches in the district. This church has a clearstory, a very unusual arrangement in this locality where the aisles are so lofty. The choir has an octagonal end. The building was repaired 1706. The extreme size inside is 340 ft. or 350 ft. long, inclusive of the towers; or 280 ft. STREET; or 272 ft. KING: height of the nave vaulting 123 ft. or 128 ft.; 108 ft. STREET; 152 ft. ZEIT; or 130 ft. KING: height of aisles 65 ft.; 59 ft. STREET; 67 ft. KING: width of nave 45 ft. ZEIT; 41 ft. KING, and a total width of 105 ft. without the chapels. The north-west tower is dated 1304 and the south-west tower 1310; they are 51 ft. square at the base; both are six equal stages in height, finished with gables on each face and having octagonal spires of timber covered with copper 404 ft. high FOWLER, or about 420 ft. KING, or 344 ft. STREET. Three examples of the carved woodwork dating about 1450 of rich leafage ornamentation, are given in the *Illustrations*, s. v. pl. 95; as well as the organ, s. v., pl. 77, 78, 91, and 92, erected about 1518 by master Barthold; the part at the bottom of the small organ (pl. 92) was added 1640. SCHLOSSER also illustrates the jubé and metal tabernacle 1479 about 40 ft. high; the latter is also given in KING, *Orfèverie*, fol. Bruges, 1852, ii, pl. 89-91. The metal font dates 1337. The upper part of the brass "MVCXXI" to the burger Tidemann Berk and his wife Elizabeth; the painted glass windows by Francesco Livi (cir. 1430), and tile patterns, are given in MILDE. Seven plates of details, with ten of the "Dance of Death" 1463, in S. Mary's chapel, are given in KING.

The Jacobikirche has five aisles all of equal height with a triapsidal east end; the internal size is 147 ft. long, 106 ft. total width, and 55 ft. high: the tower crowned by a modern spire is 316 ft. high FOWLER: KING gives one plate. The Ægidienkirche is of small dimensions with a tower like those of the Marienkirche, 312 ft. in height FOWLER. The Petri- kirche, built 1163, restored 1826, has a similar tower without the gables 284 ft. high FOWLER; and is lighted by two windows in each bay with a round window over: two plates showing the organ and stone reredos are in KING: the nave and aisles are each about 17 ft. 6 in. wide in the clear and about 54 ft. high, under one roof. The S. Katherinenkirche, formerly belonging to the Minorite Friars, at present desecrated, was erected about 1320, or founded 1335 according to an inscription near the entrance; it is also said to have been pulled down 1351 and rebuilt by brother Emeke in three years: KING gives the three-aisled nave as 130 ft. long, 33 ft. wide and 83 ft. high, with a total width of 76 ft. the aisles being 44 ft. high; the octagon-ended choir is the same width and 103 ft. long; for the convenience of the nuns of the attached southern convent (shown in SCHLOSSER) the floor of the choir is raised 20 ft. above that of the nave, being carried upon a sort of groined crypt of three aisles, the floor of which is on the same level as that of the nave: there is a clearstory but no transepts or tower: KING gives eleven plates with the roodcross, tryptich,





brass screens, etc. There are other Lutheran churches, a Reformed church, and a Roman Catholic chapel. In the ruined *burg kloster*, a Dominican monastery dating from 1229, are large remains of groined cloisters and ambulatories of molded brick; the church fell in 1818: in the ruins of S. Anne's *kloster*, now a workhouse, is a wall of the church (burnt 1843) built in alternate courses of brick and stone in the way common in Italy, but very rarely seen in the North of Europe.

The *rath haus*, a Gothic edifice to which it is difficult to assign any certain date, was burnt 1276, and again 1358; the cellars and other portions were built 1389; the part south of the market-place date 1442-44, and the alterations of the *bourse* towards the street 1570 and 1673. It forms a grand seven-turreted structure over an arcade of brick on stone columns; the upper part is executed in black and red bricks and molded bricks, without any stone: in it are several large halls, with good carving, and ceilings; an outline of the painting to one of the latter 1436 is given in KING, iv, pl. 48: part of the detail of the façade is given by NESBITT, p. 104. The *heiligen geist spital*, founded 1312 for eighty poor people, has a west façade originally the chapel, consisting of a short nave and aisles of two bays, 110 ft. wide, 63 ft. long, and 47 ft. high in the middle, having three gables divided by lofty brick hexagonal pinnacles, perfectly plain; it is now converted into a church and forms the vestibule to the hospital in the rear, 280 ft. long, 45 ft. wide, and 56 ft. high to the collar beam and 68 ft. to the apex of the roof, which is divided into cells for about one hundred and thirty persons: there is a crypt under it: KING gives seven plates with the roodloft and triptych. There are also an orphan and other hospitals; several asylums; an infirmary; a gymnasium; a school of design with numerous other schools; and a town library of 37,000 volumes.

DEMIDOFF, *Excursion Pittoresque*, fol., Paris, 1848, pl. 8, gives pl. 9-12, the market-place, the Holstein gate, one of the streets, and the river and bridge. MILDE and DERCKE, *Denkmäler*, fol., L., 1843-47: SCHLOSSER and TISCHBEIN, *Denkmäler*, fol., L., 1831-37, giving plans, etc., of most of the churches: STREET, in CHURCH BUILDER *Journal*, 1863, ii, 53-60; and in ECCLESIOLOGIST *Journal*, 1855, xvi, 29-36 with plans, etc.: FOWLER, *Mediæval Brick Buildings of Germany*, read at Royal Institute of British Architects, 18 Feb. 1850; reprinted in CIVIL ENGINEER, etc., *Journal*, xiii, 128; NESBITT, *Brick Architecture of the North of Germany*, in the ARCHÆOLOGIA, xxxix, 1863, p. 98-107: FERGUSSON, *History*, 8vo., London, 1867, ii, 646: KING, *Study Book*, 4to., Lond., 1858-68, iv, as above noted. Two views of the churches are given in ANDERSON, *Eight Weeks in Norway*, 12mo., London, 1853, p. 108. ZEIT, *Ansichten von L.* 14. 28. 50. 92.

LUBLIN. The capital of a government in Russian Poland, situated on the river Bistrizza. It is divided into an upper and lower town, surrounded by walls and ditches; and has a large suburb; on a hill are the remains of a castle built by Casimir the Great: the houses are chiefly of timber, and the streets are uneven and irregular. It is the see of a bishop. The cathedral is dedicated to S. Michael; among the eighteen churches those of the Ex-Jesuits, the Visitandines, the Dominicans, and the Carmelites, are worthy of notice. There were formerly twelve monasteries, and six nunneries. The chief other buildings are a Piarist college; a synagogue; a gymnasium; an academy of sciences; several hospitals and charitable institutions; a good town house; a palace formerly belonging to Sobieski; a military house of correction; and a theatre. 14. 50.

LUBRICATOR. An unguent, such as grease, used for the purpose of diminishing the friction between surfaces of machinery revolving in contact with one another. For this purpose it is desirable that it should be presented in a thin continuous stream, when the proportion of the friction to the pressure is found to be 0.07 or 0.08. All grease does not produce the same effect, thus tallow when used between metals rolling over each other produces a friction equal to 0.10; so

that experiments should be tried on every lubricator to be used in particular cases. Tallow, hogs' lard, soap, palm oil grease, etc., are the lubricators most in use amongst the solid greases. INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, ii, 72, etc. BLACK LEAD is sometimes employed for the same purpose.

OVERMAN, *Mechanics for Wheelwrights*, etc., 8vo., Philadelphia, 1861, p. 397, gives "Tables of Frictions" with the coefficients of the materials. HURRY's patent lubricating machinery is described in the PRACTICAL MECHANICS' *Journal*, 1850-51, ser. 1, iv, 204.

LUCARNE (Lat. *lucerna*; It. *fenestrella*; Sp. *lumbre*; Fr. *lucarne*; Ger. *dachfenster*), in England corrupted into LUCERNE and LUTHERN. A term adopted from the French language for a window of a room formed in the roof of a building; it is applied both to a window placed in the wall, carried up to receive it, and to an upright light resting on the rafters of a roof. VIRLOYS, *Dict.*, 1771, ii, 186, pl. xxi, describes seven sorts, called square, semicircular, bull's-eye, flat-arched, etc. and Flemish, the latter being formed in masonry over an entablature and sometimes finished with a pediment: they are also shown in AVILER and other French 'Cours' of the seventeenth and eighteenth centuries. KRAFFT, *Plans*, etc., *de la Charpente*, fol., Paris, 1805, pt. 2, pl. 24, gives fourteen examples of the construction of various sorts of lucarnes. *Illustrations*, 1861, pt. 2, at Lisieux, s.v. Half Timber House; and 1867, pt. 1, s.v. Lucarne.

LANGLEY, *Masonry*, fol., London, 1736, in *Dict.*, explains that "Luthern" is the same as "dormer," and that it stands on the rafters of a roof. But the term DORMER, or DORMANT, window; or a killesed or culldiged window; or a cripple window; or a storm window, as it is called in various localities, is now generally given solely to an upright light formed in the slope of a roof and set within the line of the wall. 41.

In a letter dated 13 June 1556, Roger Warde, mason, writes to Sir W. Cecil for instructions as to the building of three "lucan" windows for the inner court, etc.: STATE PAPERS, *Domestic Series*, p. 84. In a bill for work at Newark, done 1694, "13 Luthern windowes in ye Rooft" cost 18s. each; Addit. MS. 11,016, fol. 64, British Museum.

LUCCA (Fr. *Lucques*). The capital of the former duchy of the same name now included in the kingdom of Italy. The town, situated near the river Serchio, was regularly walled 1550-1620, and is entered by four gates; the ramparts are now planted. The streets though not regularly formed, are spacious, clean, and well paved; the houses are well built. The springs in the hills are collected in an extensive reservoir whence the water is conveyed into the city by an aqueduct of two miles (11,624 ft.) in length, consisting of four hundred and fifty-nine arches, each 17 feet span, terminated by a large distributing reservoir near the railway station; the total expense was 1,130,157 fr. or £45,207 (*Detached Essay*, Aqueduct, p. 12). The minimum supply in the height of summer is 819,280 litres or 190,320 gallons, affording about 9 gallons per day for each inhabitant. This aqueduct was formed 1823-35 by L. Nottolini for the duchess Maria Louisa of Bourbon, a statue of whom was placed in the *Piazza ducale*, which had been laid out 1806 by P. T. Bienaimé, who planned this aqueduct and designed other works for the duchess Elise Baciocchi, 1806-10. The statue 1823 of Carlo III. was by L. Bartolini. The *arena* of the Roman amphitheatre is filled up to a height of 11 ft.; the site was cleared by L. Nottolini; the chief remains are at the north and east gates; the modern dwellings around are chiefly composed of the huge solidly constructed arches and masses of brick and stone: it has been calculated to have held about 10,700 persons, and had two stories of arches each fifty-four in number: in the oval now called the *piazza del mercato*, is held (since 1839) the fish market. Some small remains of an ancient theatre also exist. More Longobardic buildings remain in Lucca than in any other place.

The *duomo* or cathedral dedicated to S. Martin, was founded

1063 and consecrated 6 Oct. 1070. The lower arches of the nave are round, the Pointed upper ones were added 1308-20 (by G. Pisano, WEBB) when the church was lengthened by a Pointed choir with the tribune, and raised; the large triforium has Pointed arches filled with geometric tracery on slender columns; the clearstory has round arched windows: the vaulted roof is painted: the aisles are groined. The façade, in imitation of that of the cathedral at Pisa, was erected 1204 by GUIDETTO; the portico with its ornaments cir. 1233 and early inscriptions; on one of the lateral pilasters is a representation of a labyrinth or maze of the twelfth century, 19½ in. in diameter (given in *Illustrations*, s. v. Maze, 1867, Part I; DIDRON, *Annales Arch.*, xvii; and TROLLOPE, in ASSOCIATED SOCIETIES, *Reports and Papers*, 1858, p. 253). Part of the curious Gothic mosaic pavement remains; the deeply tinted stained glass dated 1433, is by Ugolino da Pisa; a choir window was given with the date 1489, by WARING, *Arts connected with Architecture*, fol., London, 1858, pl. 6. An iron cresset is suspended from the vaulting of the nave. The marble pulpit 1498 was executed by a native sculptor Matteo Civitali, who also carved 1472 the tomb of Pietro da Noceto, considered by CIOGNARA, *Storia*, fol., Venice, 1816, ii, pl. 18., one of the best works of that date. The tomb 1413 (not 1544) of Ilaria del Carretto, wife of Paolo Guinigi, by Jacopo della Quercia, is much praised by VASARI. An octagonal temple or chapel of marble richly gilt and adorned was erected 1481 by M. Civitali for D. Bertini; the sculptures are said to be by Fancelli of Rome: it contains the crucifix of cedar wood (*volto santo*), supposed to have been carved by Nicodemus, and miraculously brought to Lucca in 782; others say in 1282. CALENDAR. At the south of the west front there is a huge square tower, plain as high as the façade, and panelled in five stages above, with forked battlements. A plan is given in LECLERE, *Recueil d'Arch.*, fol., Paris, 1826, pl. 17.

The church of SS. Vincenzo and Frediano known as S. Frediano (died 578) is said to have been founded 671 by Pertharit, king of the Lombards, in honour of the bishop and saint Fredianus, son of an Irish king, and was completed by his successor Cunipert. CORDERO, p. 232, 244, 254, thinks it had originally a Latin cross for its plan; it now has a nave and aisles with two rows of eleven antique columns averaging 20 ft. in height with round arches over, and is 207 ft. long, 70 ft. wide, and 69 ft. high, without transepts, and decorated with mosaics, frescoes, and paintings. The materials were chiefly taken from the amphitheatre: when the new walls of the city were constructed in the twelfth century, this church was included in their circuit; and, in order that the edifice might face the street, a new entrance front was built by the abbot Rotone who had the apse removed from that end and rebuilt with the old materials on the site of the original: in this alteration the fourth and fifth aisles were added (making four additional bays to them) of Monte Pisano white marble, the chapels were added, and the level of the choir was raised above that of the nave; it was reconstructed 1145-53: but the mosaic pavement resembling that at Westminster, the mosaic 'galilee' in the gable, and the font for immersion made by the "magister Robertus" as inscribed on the rim, probably belong to the thirteenth century: the modern font is by Niccola Civitali. A slab of marble 17 ft. long by 7 ft. high is said to have been brought from a quarry four miles distant. The open rafter roof dates 1843. The campanile is detached and was probably added cir. 1105 to the right of the former entrance before the alterations in the twelfth century; its windows increase in the number of their arches in ascending, with a wide one in the top story; it has been (1861) restored; GALLY KNIGHT, *Eccles. Arch.*, fol., London, 1842-4, i, pl. 16. The former cathedral, dedicated to SS. Giovanni and Reparata, is a basilica probably as old as that of S. Frediano; the chancel is destroyed: three fluted white marble columns are ancient Roman work: the roof is modern: the Pointed baptistery, a large square building

with an octopartite vault from shafts and an external cupola has been altered, and the font removed; the whole has been well restored. S. Michele in Foro was founded 764 by Luitprandus and Gumparda his wife, the bulk of the fabric belongs to that date; the rich façade of white marble from quarries in the neighbourhood, was added 1142, 1188 or 1204 (WEBB states 1070) by GUIDETTO, after the fashion of that at Pisa but executed in a more florid style; it is called "Pisan-Romanesque" in *BUILDER Journal*, 1861, xix, 8, giving an engraving of the upper portion; the whole elevation is shown in WOODS, *Letters*, 4to., Lond., 1828, ii, 409. The colossal marble statue of the archangel at the summit has the wings of separate plates of bronze so contrived as to suffer the wind to pass through them freely: there are two colossal figures of angels at the two angles. The south side has a range of small arcades over another of larger ones, which is probably the "second order of the lateral colonnade" and the "one range to the left wing of the front" that was added 1377. The changed level of the floor of the presbytery, and the addition of the altars, accompanied the erection about 1430 of the east end and the oblong campanile of six stories with a modern belfry: the vaulting is said "to have been done in the sixteenth century", (WEBB): as at S. Frediano, there is a clearstory but no triforium. The building, shown in GALLY KNIGHT, ii, pl. 14, has been lately (1868) restored.

The following churches also deserve notice:—Sta. Maria della Rosa is Gothic, dating 1309: S. Cristoforo shows the transition from Romanesque to Italian Gothic art; it has a curious circular window: S. Francesco, of the Observantines, erected early in the fifteenth century, has a nave 66 ft. wide; the roof was repaired in 1861: S. Giusto, a small church "of the Pisan-Romanesque style, with three west doors with projecting lions and carved lintels" (WEBB), has been modernised: Sta. Maria Nera or di Corte Landini (or Orlandini) built in the thirteenth century, retains only vestiges of that date; the interior is entirely modernised. A good library of 20,000 volumes is attached to the convent of the Chierici Regolari della Madre di Dio: Sta. Maria Forisportam, a fine Pisan-Romanesque church, was altered 1516 by raising the nave and transepts; the façade is somewhat similar to that of the cathedral; the six Corinthian capitals of the pilasters of the lower tier, and the architrave of the centre door appear to be antique Roman work: S. Pietro Somaldi, in use 763, has a front of Romanesque mixed with Italian-Gothic work, added 1203: S. Romano, dating from the eighth century, was commenced to be altered 1656 by V. Buonamici (*Handbook*), but by Fra G. Buonvisi (MARCHESE), the front has been left incomplete: against the outer wall of the nave are four large tombs each with a canopy, like those at Verona: S. Salvatore, an ancient building, has some curious sculptures about 1180 by Biduinus and earlier.

The ducal palace, now the *palazzo pubblico*, has two façades; it is a large pile though scarcely half that of the original design 1578 by B. Ammanato, which was much altered 1729 by F. Juvara and F. Pini; the interior was decorated 1806-10 by Bie naïmé for the duchess Elise: the peristyle of Doric columns of pietra di Guamo, leading to a great white marble staircase, was executed for Maria Luisa by L. Nottolini. Attached to it is a library of 40,000 volumes and some manuscripts. The palazzo Borghi, intended for habitation as well as defence when built 1413 for Paolo Guinigi, is now (1823) used as the *deposito di Mendicizia*; it is a ponderous red brick edifice in the Italian Gothic style with mullioned windows and a gloomy cortile; the exterior is unaltered: trees are allowed to grow on the top of its many-storied tower. On the opposite side of the same street is another palazzo of three stories, nearly in the same style and bearing the Guinigi arms; it is given as thirteenth century work, in VERDIER and CATTOIS, *Architecture Civile*, 4to., Paris, 1855, i, 127. The *palazzo pretorio* or municipality, a massive sombre edifice, in the Renaissance

style: the palazzo Guidiccioni containing the public archives; the palazzo Bernardini; the bishop's palace; and a small theatre 1806 by P. T. Bienaimé; are also worthy of notice. There are also many educational institutions, and a botanic garden. The BRACCIO of 12 oncie is 0.590409 metric, which CORDERO, p. 237, 267, says is known to this day in some places as the *pièdre legittimo di Luitprando* (713-44), who probably received from the Arabs this (perhaps Egyptian) CUBIT which, as noticed in the essay *Delle misure Lucchesi*, published by the REALE ACCADEMIA LUCCHESA, *Atti*, 8vo., Lucca, 1821, i, 15, began in his time to supersede the antique foot. The *canna* of 4 braccia is 7 ft. 8.99 ins. English.

About eight miles from the city near the lake of Massaciucoli are situated the Roman remains called the baths of Nero. The villas Torrigiani at Camigliano; Mansi and Mazzorosa at Segromigno; and Montecatini at Gattajola, are amongst the finest in Italy. The celebrated "baths of Lucca" are about 15 miles distant; on the road to them is Marlia, a summer residence of the sovereign; and several handsome villas belonging to the Lucchese nobles. The ponte della Maddalena over the river Serchio, about half-way to the baths, is built of grey limestone, with a semicircular arch 120 ft. 6 in. span springing from the bed of the river, 62 ft. high to the soffit, which is 12 ft. wide with a roadway of 8 ft.; the other arches are 46 ft. 10 in., 33 ft., 28 ft., and one on the other side of 17 ft. 6 in. span; TOWNSHEND, in *Proceedings* of the Institution of Civil Engineers, 1842, who dates it 1317; it is illustrated in HANN and HOSKING, *Bridges*, fol., London, 1843, pl. 58, p. cxxxv, with the date 1000. The *Handbook* states that it was built 1322 for Castruccio Castracani degli Antelminelli (ob. 1328); and is commonly called the *ponte del diavolo*.

WARING and MACQUOID, *Architectural Art*, fol., London, 1850, give pl. 2, six archbands from Lucca and Pisa; pl. 7 and 8, views of the city; and pl. 18 the town hall. WEBB, *Continental Ecclesiology*, 8vo., Lond., 1848. LALANDE, *Voyage en Italie*, 12mo., Venice, 1769, ii, 535, with a plan. *Guida sacra alle Chiese di L.*, 12mo., London, 1736. TRENTA, *Guida del Forestiere per la Città e il contado di L.* (cir. 1855). CORDERO, *Italiana Architettura*, etc., 8vo., Brescia, 1829. BERTINI, *Memoria per servire alla Storia Ecclesiastica Lucchese*. *Ecclesiologist Journal*, 1868, reprinted in *BUILDING NEWS Journal*, 1869, xvi, 28. *BUILDER Journal*, 1867, xxv, 601. In the Bib. Reg. in the British Museum, are five good outline ink sketches of the chief views. 14. 28. 50. 96.

LUCCA (ROBERTUS DE) made in the twelfth century (CORDERO, p. 237, says middle of the thirteenth) the font inscribed "Robertus magister" in the church of S. Frediano at Lucca. 28.

LUCCHESI (MATTEO), born 1705, practised at Venice where he built the church of S. Giovanni in Oleo, commonly called S. Giovanni Nuovo, but by himself 'il Redentore redento' as being a duplicate of Palladio's Chiesa del Redentore, freed in his opinion from the faults of the original. He erected the hospital near SS. Giovanni e Paolo, called the ospedaleto, at Venice; and constructed the palazzo de' Polcenighi which has a celebrated flight of steps, at Polcenigo in Friuli. He died 1776. SELVATICO, *Sulla Architettura*, etc., 8vo., Venice, 1847, p. 466, notices two pamphlets by him; one being *Lettere sulla pretesa scoperta del sopra ornato Toscano*, 8vo., Venice, 1730. 26.

LUCCHESI (GIUSEPPE) practised at Naples where he rebuilt 1705 the church of S. Nicola a Nido; and 1723 that of S. Biagio de' Taffettanari. 95.

LUCCHINO DA MILANO, see MILANO (L. DA).

LUCENTUM. The Latin name of ALICANTE, in Spain.

LUCERA (the Latin *Luceria*). An ancient city of Apulia, in Italy; situated on a rocky eminence, surrounded by old walls with five gates. This capital of the Samnite Daunia was destroyed about the seventh century by the Greeks; it remained in ruins till 1239 when it was restored by Frederick II, emperor

of Naples (1219-50) as a residence for the Sicilian Saracens whom he planted there, and who were expelled in 1269. On the edge of the same eminence about a quarter of a mile distant is the castle surrounded by a wall and a moat with a drawbridge. The castle is almost entirely the work of Frederick II; the large square tower in the centre is generally regarded as a portion of the Roman citadel: though in ruins it is an imposing pile; its extent is scarcely surpassed by any similar building in Italy, for it was apparently intended to contain a second city within its walls: in the area were extensive suites of apartments for the sovereign; a mosque; and a series of cisterns to supply the garrison. Two of the towers are circular, the larger one is remarkable for the regularity of its masonry. The streets are narrow and ill-paved, but the town is in general substantially built.

The cathedral is dedicated to the Assumption of the Virgin: though said to have been built by Charles II of Anjou (1269), it was an old structure when formed into a mosque, and still retains traces of Moorish architecture on the exterior; the interior is Gothic and but little changed; it has thirteen columns of verde antique marble found under the edifice and supposed to have belonged to a temple of Apollo; it was again made a cathedral after the battle of Benevento 1296. Another column of verde antique and two of cippolino 20 ft. high, were discovered in 1737. The pulpit, like that in Salerno cathedral, has Greek mosaics. The Christian church now the Madonna della Spica is still standing outside the walls. Among the other buildings are the bishop's palace; the *tribunale*, an extensive pile containing the court of justice and other offices, with the residences for the judges and officials; the public prison; and the royal college. SAINT NON, *Voyage Pitt.*, fol., Paris, 1781-83, iii, 13. 28. 50. 59. 96.

LUCHESI (JOHANN), practising at Innsbrück, died there 1581. 26.

LUCIANO LAURANA, see MARTINI (L.).

LUCKNOW. The capital of the kingdom of Oude in Hindostan, is situated on the river Goomtee which is about 300 ft. wide, crossed by a stone bridge of ten irregular pointed arches, by an iron bridge (1858) of English manufacture, and by a bridge of boats. The town extends for about four miles along the south side of the river between it and a canal, and is nearly two miles in width. The centre portion, traditionally founded by Lakshmana, brother of Rama, is the most ancient; the houses generally have mud walls and straw roofs, and many are no better than booths of bamboos and mats, thatched with palm branches or leaves; the number of brick-built houses is small; the streets are generally sunk 10 ft. or 12 ft. below the level of the shops, and are so narrow that in many places an elephant can scarcely pass. In the better quarter the buildings are well erected in broad and clean streets. Aurungzebe cir. 1660 destroyed the castle placed on an eminence and built a mosque on its site. To the south-east of it is a division of the town said to have been built by Saadat Ali, the nawaub vizeer who ruled in Oude from 1798 to 1814; his palace is still incomplete. From this division extends a good street south-east, stated to be a mile in length, called Chinka Bazaar or Chinese market, having a lofty gateway at each end. Between this street and the right bank of the Goomtee is the principal palace of the king; the part called Furuahkush towards the river is the best portion, with gardens well laid out, wells, fountains, reservoirs lined with marble, etc. The British residency was near the west end of the palace; its church in a Gothic style was nearly destroyed during the mutiny. The north-western portion of the city was built by Asaf ud Dowlah, the nawaub vizeer from 1775 to 1797 who removed the seat of government from Fyzabad; its great ornament is the Imambarah (holy palace) said to contain the largest arched room in the world, and in which that vizeer is buried; a plan is given in FERGUSON, *History*, 1867, ii, 703, showing this principal apartment 162 ft. long and 53 ft. 6 ins. wide, on two

sides are verandahs each 26 ft. 6 ins. and 27 ft. 3 ins. wide, at each end of it is an octagonal apartment 53 ft. diameter; the whole interior dimensions are 263 ft. by 145 ft. The building is entirely covered with vaults of coarse concrete several feet thick. The attached mosque is of white marble with three domes and minarets. With the exception of the royal tombs and the principal mosque, the chief edifices are all modern, and those of this century are of pseudo-Italian architecture, the religious structures preserving the appearance of debased Mahomedan style; as the Furrah Buksh; the Chuttar Munsil; the Kaiser Bagh or residence of the late monarch, a great square of buildings surrounding an immense court-yard: the Begum Kotie, better in style, is shown in FERGUSON, p. 421; who notices, *History*, 1867, ii, 687, that, at the commencement of the present century, a literal but spiritless copy of the Taje mahal at Delhi was erected over the grave of one of the sovereigns. Constantia, a palace in the suburbs erected 1780-90 by General Claude Martin (died 1800 at Lucknow) of brick stuccoed, is becoming ruinous; it is said to have cost £150,000 sterling; a view from a photograph is given in FERGUSON, *Modern Arch.*, 8vo., London, 1862, p. 419; this palace set the example in the city of the pseudo-Italian style; a curious description of the house, villa, and Gothic castle, is given in ACKERMANN, *Repository of Arts*, 8vo., London, 1823, ii, 99. An observatory was established by Major Wilcox.

FORREST, *Pict. Tour of the Ganges*, etc., 4to. London, 1824, p. 166, pl. 20. SALT, *Views in India*, fol., Lond., 1809, gives pl. 6 a view, and pl. 7 the chief mosque; and refers to the view of the Rumi Derwazah and the palace of Saadit Ali khan, given by Lord VALENTIA, *Travels*, 4to., Lond., 1809, i, 157, who describes an Imambarah, with its deep and wide well. OLIPHANT, *Kalmandu*, 8vo., London, 1852; MINTURN, *New York to Delhi*, 8vo., London, 1858, p. 150-77. A view of the town with a description is given in ILLUSTRATED LONDON NEWS *Journal*, 1856, xix, 441-2. DANIEL, *Oriental Scenery*, fol., Lond., 1801, 3rd series, shows pl. 5 the gateway Punj Mahalla; and pl. 16 the palace of the nawaub Suja Dowlah. ANDERSON, *Siege of Lucknow*, 12mo. Lond., 1858; STANFORD, *Plan of L.*, 1858; (WYLD), *Sketch of the Residency*, etc., London, 1858; and *Views in L.*, photographed from drawings by major Macbean, 1858, exhibiting the results of the mutiny in 1857. 14. 50.

LUCOMBE, see LEUCOMBE, and LOOKUM.

LUÇON. A town in the département of La Vendée in France; connected with the sea by a canal. It is a large but dull town, irregularly built, and dirty. It is the episcopal see founded 1317, to which Richelieu was appointed at the age of twenty-two. A large Gothic cathedral, dedicated to the Virgin, with three aisles, is very mixed in style; it has a lofty spire of open work: there is also a monastery, a hospital, and a large seminary. 28. 50. 63. 96.

LUCULLAN MARBLE, see BLACK MARBLE.

LUCULLITE or STINK-STONE. A species of limestone, compact or sub-lamellar in texture, of a grayish colour, emitting the smell of sulphureted hydrogen under friction or a blow. It occurs at Assynt in Sutherlandshire; in Derbyshire; and in the counties of Kilkenny, Cork, and Galway.

LUCUS ASTURUM. The old name of OVIEDO, in Spain.

LUDEDERO (BERNARDINO) of Torchiana, a Casinentine monk, commenced 1510 the church of the monastery of S. Giovanni at Parma; TIRABOSCHI, *Pittori*, etc. di Modena, 4to., Modena, 1786, p. 34.

LUDHAM (T. DE), see LOUDHAM.

LUDION. One of the three Greek names, for the tiles used as bricks, which was applied according to VITRUVIUS, ii, 3, to the size that was used by the Romans and not by the Greeks, being 18 ins. long by 12 ins. wide.

LUDOVICI (FRIEDRICH), a German of Italian family, was born about 1672, and 1707 went to Lisbon. He was commissioned by John V of Portugal to design, in rivalry of the

Escorial, the immense palace at Mafra, seventeen miles north-west of Lisbon; the first stone was laid 17 November 1717, and the church was consecrated 1730. He also designed 1721 the choir of the cathedral at Evora; and died in 1752. The works at the palace were continued by a son João Pedro, who had been studying the canon law in the university at Coimbra, and died in 1803. 88. 112.

LUDOVICO (LORENZO DI), usually called Lorenzetto, born 1494, was the son of Ludovico, a bell founder of Florence, and became a favourite pupil of Raffaello Sanzio. He chiefly worked in sculpture executing many tombs at Rome and elsewhere; and designed several houses, more especially the palazzo Bernardino Caffarelli; and one of the interior façades in the Valle for Andrea Cardinal della Valle, and prepared the design for the stabling and upper garden: he also built for himself a house at the Macello de' Corbi. Pope Paul III (1534-50) having decided to continue the fabric of S. Peter's, Antonio da San Gallo caused Lorenzo to be appointed his assistant architect, but he died soon after of fever in 1541 aged forty-seven years, and was buried in one of the vaults. He is called Laurenzetto Lotti, in VIRLOYS, *Diet.* 73.

LUFFER BOARD. The old way, not quite obsolete, of writing LOUVRE BOARD.

LUGANO (GIROLAMO DA), is recorded at Volterra in an inscription over the door of the three-towered *casa* Guarnacci, which shows that the first tower was erected early in the thirteenth century, and records his name as its designer. 28.

LUGANO (SEBASTIANO DA) with Moro Lombardo he designed the church of S. Giovanni Grisostomo at Venice, incorrectly attributed to Tullio Lombardo, as stated *s. v.*; and made 1515 second design for the church of Sta. Giustina, at Padua.

LUGAR (ROBERT), commenced exhibiting 1799 at the Royal Academy of Arts in London; 1802 cottage at Eastwood, co. Tipperary in Ireland; 1803 cottage at Dedham, Essex; 1805, design for a museum for the reception of the antiquities of the late C. Townley, esq.; 1806 a house to be built at Stanford-hill for Mr. Bayley; and a house now building at Gold-hill, Shoreham, Kent; 1808 a house in a castle style now building for J. Stirling, esq., of Cordale, near Dumbarton; and view of an abbey designed for J. Buchanan, esq. of Glasgow; 1809 Mr. Buchanan's (sic) castle (NEALE, *Seats*, etc., 4to., London, 1823, vi, gives Balloch castle, Dumbartonshire, seat of John Buchanan of Ardock, esq., M.P., as built 1809); and Mr. Barnardiston's house; 1816, alterations at Oxney park, near Dover, Kent, for John May, esq., (NEALE, 1825, ser. 2, ii); and 1821 Warley, near Birmingham, for H. Galton, esq.; NEALE, 1828, ser. 2, iv, shows the additions at Swinton park, Yorkshire, for William Danby, esq., originally built by James Wyatt and John Foss of Richmond; viz., a museum 16 ft. by 42 ft., a billiard room 26 ft. by 29 ft., a library 42 ft. by 24 ft., and entrance hall, 21 ft. diameter, with towers to the east and west.

He published *Architectural Sketches for Cottages, Rural Dwellings, and Villas*, 38 pl., 4to., London, 1805; *Country Gentleman's Architect; Designs for Farm Houses and Yards*, etc., 21 pl., 4to. London, 1807; *Plans and Views of Buildings executed in England and Scotland*, 32 pl. 4to., London, 1811; and *Villa Architecture*, 4to., London, 1828, 42 pl. consisting chiefly of executed buildings, and comprising, among smaller works, Betsanger, near Sandwich, Kent, for F. E. Morrice, esq.; New Laithes, Horseforth, near Leeds, Yorkshire, for Chas. Greenwood, esq.; Hensol, near Castle Douglas, Kircudbright, for John Cunningham, esq.; Glenlee, New Galloway, Ayr, for right hon. lady Ashburton; Markgate cell, near St. Alban's, for Daniel Goodson Adey, esq.; and Cyfarthfa castle, Glamorganshire, for William Crawshaw, esq. His larger designs were chiefly in the castellated Gothic style of the period. He had retired from practice many years before his death which occurred at Pembroke-square, Kensington, 23 June, 1855, at the age of 82 years.

LUGDUNUM. The ancient name of LYON, in France.

LUGG. A quantity of land equal to 49 square yards of coppice wood.

LUGGAGE ROOM. An apartment of great use in the houses of the nobility and gentry, as a recognised depository for portmanteaus, carriage boxes, and other luggage cases, which are always well worth being carefully kept. It should have a fire-place; and need scarcely contain any fittings beyond a strong shelf or two for light boxes, and perhaps a table. A LUMBER ROOM, sometimes serves for this purpose in the smaller class of house; KERR, *Gentleman's House*, 8vo., London, 1856, p. 248. Where this room is placed on an upper floor, a lift will be found a very useful means of getting the luggage to it.

LUGGE. A quantity of land, same as a pole; a term used in the Act 25 Elizabeth, for restraint of new building.

LUGO (the Latin *Lucus Augusti*). A city in the province of Galicia in Spain, situated on the river Miño, which is crossed by an old bridge of eight arches. It is surrounded by old walls flanked by semicircular towers in good preservation, and is commanded by a ruined castle: the town is well built, with wide, clean, regular, and paved streets; having two principal and ten smaller *plazas*: there are many Roman remains. The cathedral, dedicated to the Virgin, was rebuilt 1129 by Maestro Raymundo of Monforte de Lemos who left only the belfry unfinished; the chapter had engaged his services and (in case of his death before the completion of the edifice) those of his son, on terms preserved in PELLARES GAYOSO, *Historia*, (from the black book in the archives) and mentioned in LLAGUNO, p. 25. The cathedral has a nave and aisles of ten bays; the latter are low because they carry a gallery or triforium from the front to the transept: the work was called 'finished' 1177. The design for completing the façade so late as about 1769, was made by J. S. Bort, and put into the hands of J. Elejalde for execution with variations, but its towers were still unfinished in 1830. The whole building is of granite: the north transept has an open porch, and a steeple on its east side; the belfry and upper stage of it are dated 1577: the *capilla mayor* or eastern chapel, was commenced 1764 by C. Lemaux; the stallwork in the choir 1624 is of Ionic and Composite Orders by F. de Moure who is commemorated in an inscription; the circular *capilla* de N. S. de los Ojos Grandes or Lady chapel, 42 ft. diameter, was designed 1726 by F. de las Casas and executed by L. A. Ferro-Cabeiro. The silver *custodia* on the high altar was by Juan de Arfe in 1636. A plan (which shows the internal length to be 230 ft., and the width 66 ft.), and an interior view are given in STREET, *Spain*, 8vo., London, 1865, pp. 131-5, who likewise describes the two old churches of the Capuchins and of San Domingo (cir. 1350-58). There are also several chapels, two convents, two hospitals, a town house, a prison, a theatre, barracks, several schools, an orphan asylum, and an episcopal palace with an extensive library. Nearly one third of the town was destroyed in the French invasion. 28. 50. 68.

LUKIUM. The native name for a plaster used in Turkey. The following is the receipt as now used by the *Sou Yöljee* or water-way men. 100 lbs. of fresh burnt lime of the finest quality reduced to powder, 10 quarts of pure linseed oil; and 1 or 2 ozs. of cotton. The lime is to be manipulated, the oil and cotton being gradually mixed in a wooden trough until the mixture assumes the consistence of loaf dough. This is to be allowed to dry and then broken into cakes and stored up. When required for use, the quantity is moistened with linseed oil, and this paste is applied in two or more coats to the wall or pipes, allowing each coat to dry. Pipes of metal or clay can be hermetically joined by twisting well carded hemp saturated with *lukium* round the interstices, and making it fast with cord also dipped in the mixture. This compound is said to be impervious and most adhesive; and although some tanks (*taksim*) are entirely beneath the ground (thus always exposed to outward infiltrations as well as inward pressure), and are undoubtedly coeval with the earliest Byzantine monarchs, yet there is no

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record of their requiring repair or of their having leaked. The walls of tanks are first closely cemented with *khorrassan* and then plastered with *lukium*. C. WHITE, *Three Years in Constantinople*, 8vo., London, 1845, ii, 31.

LUM. A term in use in the north of England, and in the south-west of Scotland, for a chimney or smoke flue. It is also the name for a deep hole in the bed of a river.

LUMACHELLO MARBLE. This name, derived from the Italian *lumaca*, a snail, intimates that the figures in this marble are produced by the section of small shells like that of the *limax*. The calcareous cement occurs of a black, rose, yellow, or even transparent white, colour; while the shells are white, greyish brown, or black. The ancient lumachello seems to have had bright shells set in a dark cement: the quarry which supplied the antique specimens is unknown; the spots in them are more distinctly marked than in the marble which now bear the name. Twelve fluted columns of the Composite Order, and part of the lastrication of the cappella Strozzi in the church of S. Andrea della Valle at Rome, are of lumachello marble from Tuscany; AVILER, *Dict.*, 4to., Paris, 1691, s. v. *Marbre*. The modern lumachello of Tuscany is also called *fire marble* by ANSTED, *Geology*, etc., 8vo., Lond., 1856, who describes it as a dark brown shell marble having brilliant sparkling (*chatoyant*) reflections from within. The great staircase in the palace at Caserta exhibits the large employment of lumachello from Trapani in Sicily: Cefalù, in that island, is famous for the fine specimens procured in its vicinity. The marble of Tortosa in Spain is almost entirely composed of crushed shells and, although called *brocatelle d'Espagne*, it is properly a lumachello. In the cathedral at Bourges much use has been made of grey lumachello which is said to bear some resemblance to granite, and to have been obtained from Salle-roi near that city. The only marble found in the département de l'Aube in France, is well known in commerce as *lumachelle gris*; it takes a good polish, but exhibits remains of large ammonites mixed with smaller shells, and has not an agreeable colour; BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, pp. 273 and 308; who mentions lumachelle de Bourgogne and lumachelle d'Astracan. CASTRACANE MARBLE has small bright yellow shells separated by a dark brown or rose ground. Some lumachello has greyish brown shells in a white bed; another has rose coloured bed; and a third has small black shells set very closely on a yellow ground; there is a very rare breccia, called pale lumachello, having white shells, about an inch or more in length, that are singularly disposed in a pure black body. CIVIL ENGINEER *Journal*, 1839, ii, 453.

LUMBER. The term applied, in America, to timber sawn or split for use; and to timber felled in winter, some being afterwards sawn on the spot.

LUMBER ROOM. A receptacle provided in almost all houses for old and spare furniture, broken articles, packing cases, and similar things. In many houses the space between the upper ceiling and the roof serves this purpose. A garret is a better place, as a fire-place and a window are necessary to prevent the contents being injured by damp. A loft at the stables occasionally serves as the lumber room; and is sometimes used also as a workshop for the repair of broken furniture, and other like operations; KERR, *Gentleman's House*, 8vo., London, 1856, p. 248.

LUMBY (WILLIAM), was practising at Lincoln circa 1790, and was clerk of the works at the cathedral; he assisted in making the drawing of the Norman front of that building, engraved by the SOCIETY OF ANTIQUARIES, *Vetusta Monumenta*, fol., 1791, iii.

LUMEN. This Latin word is employed by VITRUVIUS, v, 1, in the description of the basilica at Fano in the same sense as *fenestra* is used, vi, 5, by him.

LUMEN HYPÆTHRI. These words, which occur in the same author, iv, 6, where HYPOTHYRI was substituted for it by Giocondo, are explained s. v. HYPÆTHRI LUMEN and HYPOTHYRUM.

LUMEN VALVARUM. These words, also found in **VITRUVIUS**, iv, 6, are considered *s. v.* **HYPAETHRI LUMEN**, to mean the clear space intended to be closed by folding doors, independent of any light over their transom.

LUNA, the modern **Luni**. A very ancient Etruscan city of Central Italy, situated between the mouth of the river Macra or Magra and the Avenza, on the coast, giving its name to the gulf, now called the gulf of Spezzia, and to the whole province of Lunigiane. It was plundered 1016 by the Turks, and fell into decay, though it continued the seat of a bishopric until the see was translated 1465 to Sarzana. Of the Roman period still remain vestiges of an amphitheatre, a theatre, a circus, and a *piscina*, with fragments of columns, pedestals, blocks of pavement, and inscriptions. A few remains also exist of the cathedral. The place is now wholly deserted. It was the port for the shipment of the marmor Lunense or Carrara and other marbles from the time of their being first used at Rome under Julius Cæsar. The port or gulf 7 miles deep by 3 miles wide, is considered capable of containing all the navies of Europe. **DENNIS**, *Cities of Etruria*, 8vo., London, 1848, ii, 78; **PROMIS**, *Memorie della città*, 4to., Turin, 1838; reviewed by **CANINA**, *Bull. Inst.*, 1838, p. 142; **REPETTI**, *Diz. della Toscana*, 8vo., Florence, n. d. **LUNENSE**. 28. 59.

LUNA (**FRANCESCO DELLA**), began at Florence the palazzo del comunità, continued by Brunellesco; the door was by G. Vasari about 1553. The house and loggia of the spedale di Sta. Maria degli Innocenti in the piazza della Annunziata was designed by Brunellesco and executed 1429 by F. della Luna; it was opened 24 January 1444. He is said to have injudiciously departed from the drawings given to him by his master Brunellesco.

LUNA (**FRANCISCO DE**) was the architect 1523 of the bridge 450 ft. long over the river Heucar, between the city of Cuenca in Spain and the adjoining monastery of S. Pablo which, with its Gothic church, was built at the same time and was therefore probably his work. 66.

LUNATIC ASYLUM (It. *manicomio*; Sp. *alienados*; Fr. *maison d'aliénés*; Ger. *irrenanstalt*). An establishment (formerly called a madhouse) for the custody and treatment of persons of unsound mind, whether idiots or lunatics. The Act of Parliament 1816-7, 57 Geo. III, c. 106, was one of the earliest on this subject. The Act 1828-9, 9 Geo. IV, c. 40, facilitated the erection of county lunatic asylums for the poor. Two Acts were passed in 1845, 8 and 9 Vict., caps. 100 and 126; the first repealed 2 and 3 Will. IV, c. 107; 3 and 4 Will. IV, c. 64; 5 and 6 Will. IV, c. 22; 1 and 2 Vict., c. 73; 5 Vict., c. 4; and 5 and 6 Vict., c. 87. The second Act repeals 9 Geo. IV, c. 40, and gives fresh powers. The Pauper Lunatic Asylums Act, 8 and 9 Vict., c. 126 (**POWELL**, *Analysis*, 8vo., Lond., 1845). The Lunatic Asylums Act, 1853, 16 and 17 Vict., c. 97. The difference between the former and the present treatment of lunatics is very great; this is shown in an article entitled "Contrast" in the **PENNY MAGAZINE**, 1841, x, 22. Where formerly asylums were more like prisons and the inmates punished and ill-used, they are now arranged with regard to comfort, and are properly cared for and studied. The great object sought in modern asylums is the classification of the inmates according to the severity of their disease, with as little restraint as possible, and they are encouraged to associate with each other, and to occupy their minds or attention with industrial works, recreative amusements, agricultural pursuits, etc. For this purpose lunatic asylums proper are arranged with many day rooms and dormitories containing from 4 or 5 to 20 or 30 persons in each. Imbecile asylums differ to some extent from lunatic asylums inasmuch as they are for harmless individuals of weak intellect.

The recent history of Bethlem hospital, London, may be taken as an epitome of the history of lunatic asylums in England. When first erected in S. George's Fields it had all the faults of the old system of treatment of lunatics. They were

regarded very much as wild beasts, requiring ropes, manacles, strait waistcoats, and so forth (as portrayed in **ACKERMANN**, *Microcosm*, 4to., London, 1809). In 1818 a Parliamentary Commission inquired into the defects in the public charities of London, among which were those of Bridewell and Bethlem (Charities' Commission, 32nd Report, fol.) In 1821 the governors ordered an improved system—but the inquiry in 1838 by Mr. Martin was the foundation of most of the improvements that have since taken place. At that time very great extensions were made (**LAURIE**, *Narrative*, 8vo., Lond., 1838), and again in 1850-55 other very considerable additions, consisting of a number of rooms for the amusement, both physical and mental, of the patients were erected. At the same time a more careful classification of the inmates was adopted. Musical instruments were furnished to the female patients, and books for both males and females. The much abused old corridors were made attractive in appearance by flowers, birds, pictures, prints, and sculpture, and became excellent places for exercise in bad weather. The former dreary gravelled yards behind were laid out as gardens, with lawns and sheds for games of bowls, racquet, and croquet. Internal classification was made one leading subject of consideration; the noisy patients were placed together so as not to disturb and irritate the quieter ones; a few distinct rooms were provided for those who were dirty in their habits. As mental improvement takes place, the patients are kept in different galleries. A first-rate medical man was appointed to be general superintendent with full control, and he (Sir C. Hood, M.D.) completely reorganised the establishment. The last great step is now being taken, in the erection of a convalescent hospital at Witley, about 40 miles from London, from the design of S. Smirke, R.A., as a sort of annex, where patients may go when nearly well, to invigorate themselves in body and mind. This building is made as little like a hospital as possible, as it consists of ordinary sitting or drawing rooms for the two sexes, and a dining room common to both; all appearance of restraint is scrupulously avoided, and as domestic a character as possible is given to the residences. It should be noted that (except two wards exclusively for incurable patients, composed in many cases of patients who have been a great number of years incurably insane) the whole of Bethlem hospital is devoted, not to keeping only, but to curing patients; and by its regulations no patients can remain more than one year in it, except under peculiar and exceptional circumstances, for after one year it is found that the chance of cure is remote. Probably now, no similar hospital, in this country at least, unites so many facilities for the cure of the disorder. s. s.

The urgent necessity which in March 1856 was seen to exist for making "further provision for the care and treatment of increased and increasing numbers of the insane poor" induced the Commissioners in Lunacy to consider attentively the means to be adopted to meet it; and in their (eleventh) printed report dated 31st March 1857, the facts are dwelt upon. The changes which the Commissioners made in 1856 in their "Suggestions and Instructions" refer to 'sites', 'construction and arrangement' and 'plans', through which they hoped by improved arrangements to effect certain desirable results, at much less cost than had been incurred previously, yet without abridging the advantages to the inmates of the buildings. They drew a distinction between permanent places of refuge, and hospitals for treatment and relief; the latter obviously requiring to be designed with comparative disregard to cost; the former, they believed, might be of an inexpensive character. They arrived at the conclusion that a large proportion of the orderly, chronic, and convalescing patients do not require the expensive accommodations usually found in county asylums; and recommended that where asylums required enlargement, this should be effected by the erection of detached day rooms and associated dormitories, in the women's side near the washhouses, and in the men's side near the workshops and farm buildings;

not by additions to the main structure. At the Northampton hospital, the "wide galleries" especially objected to "as extremely expensive and comparatively useless" have been retained "on the ground that there is not sufficient gallery accommodation in the existing hospital."

The first building erected under the new "Instructions" was the Cumberland and Westmoreland Lunatic Asylum at Garlands, near Carlisle, designed 1857 by T. Worthington; the plan and elevations are given in *BUILDER Journal*, 1858, xvi, 294-5. The plan provides for the separation of the convalescent or working patients from the others; for warming by open fireplaces throughout; and for a reduced proportion of single bedrooms to the whole number of patients; a second upper story for dormitories is added. One hundred of each sex are accommodated.

The "Suggestions and Instructions", which are very numerous, specify the following particulars. Land to be in the proportion of not less than one acre to four patients. The form of the asylum should be such as to afford an uninterrupted view of the surrounding country, and the free access of sun and air. Principal day rooms on the lowest and middle stories to have a southern or south-eastern aspect. Separation and classification of sexes to be made. Buildings may consist of three stories provided the uppermost be devoted to sleeping accommodation. Associated day rooms and dormitories without long corridors to be provided for working patients. A chapel for three-fourths of the patients. A general dining hall. The proportion of single rooms throughout the asylum need not exceed one-third. In the upper stories, passages of communication of moderate width to be adopted in lieu of wide corridors; long, wide, and expensive corridors not to be constructed. Stairs to be of stone, without winders, and the wellhole built up. All floors to be boarded and tongued; a stone sill to all internal doorways; and other precautions in the roof for a fireproof separation at every 50 ft. in length. Walls of the galleries and day rooms to be plastered. The general height of each story to be not less than 11 ft. Associated dormitories to have not less than three beds, and not less than 50 ft. sup. to each bed. Separate sleeping rooms to be not less than 9 ft. by 7 ft. and 11 ft. high. Day rooms, one to each ward, to be not less than 20 ft. sup. per patient. Rooms for two or more attendants to each ward, 120 ft. sup. for each attendant. In each ward a lavatory, bath, waterclosets, store-room, and a slop room with a sink; all placed in projections (for better ventilation). Infirmary for one-tenth of the whole, the cubical contents of the sleeping rooms being greater than in the other parts of the building; every room to have a fire-place; a small day room is desirable. Open fire-places or fire stoves to be provided in all places; two fires in large rooms; for the chapel, dining hall, etc., hot water pipes may be used in addition. Ventilation generally to be provided for by means of flues, taken from the various rooms and corridors into horizontal channels communicating with a perpendicular shaft, in which [a heating] apparatus should be placed for the purpose of extracting the foul air. Provision for smoke flues and ventilating flues. Pipe or tubular drainage. Airing courts, two on each side, planted. Rain water to be collected for washing purposes. The supply (40 galls.) of water exclusive of the rain water to be not less than 25 galls. per patient per day. Lightning conductors. Farm buildings, and stabling, etc.; close the second part of these particulars: the third part enumerates the requisite drawings.

The Commissioners in Lunacy for Scotland appointed under an Act passed Aug., 1857, (1st Report, 1859) came to the same conclusions as the English commissioners; and in an "Appendix" they printed instructions in reference to the site and structure of asylums; these are stated at length in the *BUILDER Journal*, 1860, xviii, 4. This Scottish Report may be studied usefully with the Reports of the Committee appointed by the House of Commons, 1858-9, for information as to the cubic space to be provided in dormitories; the proportion of single

rooms and wards relatively to one another; the question of large or moderate-sized asylums; and other points. The number of cubic feet of space per patient in the Scotch asylums appears to be, as in the Morningside asylum, in the single rooms about 1000 feet, but in the galleries 600 ft.; in some asylums which are crowded there are two patients in a room of 900 cubic ft. In the Devon asylum about 470 ft. per patient is allowed in the dormitories. The Commissioners prescribe 550 ft. For the private licensed houses in Scotland, the sheriff of Lanarkshire has fixed upon 800 cubic ft.; but elsewhere the average amount is 300, and is even less than 200. The asylum at Cotton-hill, near Stafford, is referred to in recent (1858) letters as an example of the hospital required for patients of the higher class. The private asylums are numerous; they are under the surveillance of the Commissioners, and do not require to be further noticed in detail.

The following comparative cost of asylums, exclusive of land, per patient (probably without fittings), was given by the late C. Fowler in his paper read at the Institute of British Architects 22 June 1846, given in *BUILDER Journal*, iv, 349-54.

| | | | |
|-------------------|------|-------------------------------|------|
| Devon | £115 | Maidstone | £183 |
| Surrey | 173 | Lincoln (with land) | 240 |
| Hanwell | 162 | Irish asylums (average) | 183 |

The PENNY CYCLOPEDIA, Suppl. ii, 1846, gives the average of twenty-two asylums as £154 2s. 3d. per patient, including the land. The *BUILDER Journal*, 1858, xvi, 598, gives the average of the estimated cost of eight asylums as £142 19s. 1½d. exclusive of the land; but it is doubtful if they each include all the same details for a fair comparison. The asylums in Ireland built under the direction of the Board of Works, 1824-35, from the designs of Francis Johnston, were those of Armagh; Limerick; Belfast; Londonderry; Carlow; Maryborough 104; Connaught (Ballinasloe) 150; Waterford; and Clonmel: they are on one general plan, a centre block with four radiating arms; and cost on the average £183 per patient. The second series of asylums erected under the Board of Works 1847-9, hold about 250 each, except Cork, by W. Atkins, which has 500; Sligo, by W. D. Butler; Kilkenny, by G. Papworth; Killarney, by Sir T. Deane; Mullingar, by J. S. Mulvany; Omagh, by W. Farrell; Richmond, near Dublin, additions by Murray and Denny; and Dundrum for criminal lunatics: average cost £140. *BUILDING NEWS Journal*, 1867, xiv, 145.

W. STARK, architect of the first asylum at Glasgow, and of that at Dundee, was the author of one of the best works, published 1807, on this subject; his Glasgow asylum was called in 1817 by the writer in the *EDINBURGH REVIEW*, the best in Britain at the time of its erection. It had the radiating or panopticon form of plan; but this shape appears to have been considered by Stark himself not equal to that of the asylum at Dundee, which was planned in the form of the letter H, afterwards exemplified in the asylum for the West Riding of Yorkshire, at Wakefield. The Dundee building, opened in 1820, is mentioned by the reviewer as of 'admirable construction.' A modification of the radiating shape of plan was adopted 1843-6 by C. Fowler, for the Devon asylum; he got rid of some of the defects of the Glasgow arrangement, and imported some advantages; the value of his plan, however, in the present treatment of insanity, as compared with the H shape, or more especially (for asylums of the advocated small dimensions) the lineal form, has been (1860) much canvassed. Yet Dr. Bucknill, the medical superintendent, regards the building as 'not a bad working asylum,' though later buildings are improved. *BUILDER Journal*, 1860, xviii, 3. An asylum for 400 patients may probably be best built in a straight line, which is desirable, without the necessity of carrying it higher than the first floor. The chapel and chief officers' rooms, and the rooms used for the work or amusement of the patients, should form the centre; behind which the kitchen may be conveniently placed, with the laundry on the side next the wards of the women, and the workshops on that of the men. In the wards branching off

from the centre, those patients who are quiet and convalescent, and the sick should be placed, and the most refractory at the extreme ends of the building, to prevent them from disturbing the others. Six classes of patients may usually be found, for each of which some modification of management will be required. 1. Tranquil, convalescent, and melancholic; 2, moderately tranquil; 3, refractory; 4, sick and infirm; 5, idiots and other dirty patients; 6, epileptics of the better class. The three last should be placed on the ground floor. PENNY CYCLOPEDIA, Suppl. ii.

The following list of examples will afford aid in studying the subject of ichnographic distribution in relation to this class of buildings. A supposed disadvantage from an extended line of plan, in some of them,—namely, the distance of wards and rooms from the kitchen—has been alleged in the most important cases. Whilst the Colney Hatch plan has the extended line, the Brentwood one, too, seeks to preserve advantages of prospect, but with buildings arranged rather at right angles, and bounding the gardens and airing courts, which last, however, are open on one or more sides. The Leavesden and Caterham Imbecile Poor Asylums are unlike any other; they consist of several detached three-storied pavilions placed on each side of a central detached block containing the management, each block measures internally about 100 ft. by 36 ft., holding 80 beds on each floor, the ground floor being used as a day room. The first column gives the date of erection; then follow the name of the building; the number of patients provided for; the architect; and the publication in which it is illustrated by a plan or other drawing.

- 1720-4. Guy's, 30. *Report on madhouses, 1815, fol., 1819.*
 1782-4. S. Luke's, 260. G. Dance, jun. *DURAND, Parallèle, pl. 29.*
 1815-60. Bethlehem, 400 in 1849; 324 in 1868. J. Lewis, with additions, etc., by T. Hardwick and S. Smirke.
 Charities Commission, 32nd Report, 1818. ALLGEMEINE
 ZEITUNG *Journal*, 1841, pl. 397-8. LAURIE,
Narrative, 1838; (all old plans).
 1849-51. Colney Hatch, 1217 in 1857; 1930 in 1863. T. Daukes.
ARCHITECT Journal, 1850, ii, 512; WEALE, *Handbook to Lon-*
don, p. 609; *BUILDER Journal*, 1847, 585; PARCHAPPE, pl. 3.
 1829-31. Hanwell, 300 in 1830; 965 in 1851; 1601 in 1863.
 WEALE, *Handbook*, p. 605. *Report* 1843, pl. 163.
 1846. Devon, Exeter, 450; 673 in 1866. C. Fowler.
Report 1843, pl. 167-62. PARCHAPPE, pl. 4.
 Wakefield, Yorkshire, 420. Watson and Pritchett.
 Published by them, fol., 1819. *Report* 1843, CIVIL
 ENGINEER *Journal*, 1850, xiv, 133. PARCHAPPE, pl. iv.
 Dundrum, 120. J. Owen. *Report* 1843.
 Limerick. *Report* 1843, pl. 156.
 Carmarthen, etc., 270. D. Brandon. B., 1863, xxi, 602.
 Cork, Eglinton Asylum, 500. W. Atkins. B., 1852, x, 754.
 Coton Hill, Stafford. Fuljames and Waller.
 B., 1854, xii, 50; 509.
 Abergavenny, 250. Fuljames and Waller. B., 1852, x, 299.
 Brentwood, Essex, 450. H. E. Kendall, jun. B., 1857, xv, 273.
 Garlands, Carlisle, 200. T. Worthington. B., 1858, xvi, 294.
 Omagh, 300. W. Farrell and Son. C.E., 1850, xiv, 25.
 1843. Glasgow (new), 600. G. Wilson. PARCHAPPE, pl. 3.
 1851. Devizes, 286. T. H. Wyatt. PARCHAPPE, pl. 4.
 1863-9. Leavesden. } Giles and Ewen. B. 1865, xxvi, 541, 550.
 Caterham. }
 N.B.—The first annual report issued on the asylum generally contains
 its plans and views.
 1813. Aversa. GUALANDI, *Il celebre Stabilimento*, 8vo., Bolog., 1823.
 1841. Alençon (l'Orne). Dedaux.
 NORMAND, *Paris Moderne*, 1837, pt. ii, pl. 141-2.
 Braqueville (Haute Garonne), 1000. J. Esquié.
 DALY, *Revue Générale*, 1865, xxiii, pl. 24-32.
 1838-45. Charenton (Seine). Gilbert aîné.
 ALLG. ZEIT., 1852, pl. 504-5; DALY, *R. G.*, 1852, x,
 pl. 28-34; liv, pl. 16-9. PARCHAPPE, pl. 3.
 Rome, S. Spirito, 500. LETAROUILLY, *Rome Moderne*, pl. 256-61.
 1849. Quatre-mares, near Rouen, 380. Grégoire. PARCHAPPE, pl. 1.
 Niort. Philippon. PARCHAPPE, pl. 2.
 Halle, Prussia, 400. PARCHAPPE, pl. 2.
 1845. Trenton, New Jersey, 200. PARCHAPPE, pl. 3.
 1829-34. Turin, 430. Talucchi. PARCHAPPE, pl. 3.
 1828-34. Mans (Sarthe), 220. PARCHAPPE, pl. 3.

- Sachsenburg, near Schwerin, 200. PARCHAPPE, pl. 3.
 1843-51. Meeremborg, near Haarlem, 300, 150. Zocher & van der Linden.
 PARCHAPPE, pl. 4.
 1837. Illensau, 410. Voss. PARCHAPPE, pl. 4.
 1848. Vienna, 400. PARCHAPPE, pl. 4.
 Auxerre (Yonne), 350. Boivin. PARCHAPPE, pl. 4.
 Bassens, near Chambéry. PARCHAPPE, pl. 4.
 1846. La Grimaudière, near Napoléon-Vendée, 200. PARCHAPPE, pl. 4.

A statement by FAIRLESS, *Suggestions concerning the construction of Asylums*, Edinburgh, 1861, with plans and specifications prepared by W. Middleton of Montrose, explains that an asylum for 350 pauper lunatics, with all the necessary accommodation, may be provided for £16,698 or £47 14s. per patient, with a facility for making additions, at an estimated outlay of £23 for each; and when £20 a head is added for site (a quarter of an acre for each patient), and £12 for furnishings and clothes, "these sums will make the entire cost about £80, instead of ranging from £150 to £250 for each patient; and for this sum we have no imperfect, make shift asylum, but an institution as perfect in all its parts, and as fully adapted to the great purpose contemplated by all asylums as any of the more costly buildings." An asylum for 350 patients built on these principles, it is maintained, would only cost in all about £28,000 instead of £63,000 or thereabouts, according to English rates, for land, buildings, and fittings, etc. The leading feature of the above plan is its arrangement in detached portions, not on the "village system," but as separate houses for the bulk of the patients; with infirmaries, workshops, etc., grouped around a central building containing the hospital for acute and dangerous cases, kitchen, stores, officers' apartments, etc.; the houses being connected by covered ways for facility of communication, and built only as need for them arises, so that no unnecessary expenditure may be incurred. This principle is substantially that recommended by the English Lunacy commissioners in their *Report* for 1857, as applicable to additions required to be made to existing asylums on the popular model; but Dr. Fairless proposes its adoption *ab initio*. *BUILDER Journal*, 1861, xix, 299.

The buildings auxiliary to the existing asylums, substituted for the workhouse provision, which would be preferred to enlargement of each main building of the asylums, need not, it is considered, cost much more than half the outlay on the first erected building; the cost of such buildings, says Mr. Lutwidge, would not be much more than £40 or £50 a head, whereas for asylums the cost is from £100 to £150. (*BUILDER Journal*, 1859, xvii, 721.)

The two asylums for the imbecile poor now being erected at Leavesden Woodside, near Watford; and at Caterham, near Croydon, each for upwards of 1,500 patients, by the Board for the Metropolitan Asylum District, under the provisions of the Metropolitan Poor Act, 1867, probably will contain the latest views and improvements devised for this class of building.

PARCHAPPE, *Des Principes à suivre dans la fondation et la construction des Asiles d'Aliénés*, 8vo., Paris, 1853, gives a very complete history of the subject, of the various systems of management (depending somewhat upon the opinions of the chief medical attendant), and of the buildings, in all countries. It gives also a list, occupying three pages, of publications from 1785 to 1855; but it is scarcely necessary here to name any one of them, for the treatment of the insane now differs widely from earlier views. TANNER, *Not. Mon.*, fol., London, 1744, p. 322, notes the proposed establishment 1369 of "an hospital—for such poor priests or other poor men and women as should be distracted, till they got well again and recovered their wits and memory."

EDINBURGH REVIEW for 1814 and 1817, the latter upon the Parliamentary Reports of the two preceding years. *Reports* from the Committee on Madhouses in England, 1815-6, fol., 1819, giving Starks's plan of Glasgow. *Report of Select Committee on Pauper Lunatics in Middlesex, and on Lunatic Asylums*, fol., 1827. *Report from Select Committee on the*

State of the Lunatic Poor in Ireland, fol. 1843. *Report of the Commissioners for inquiring into the State of the Lunatic Asylums in Ireland*, fol. 1858. *Report of the Commissioners for enquiring into the Erection of District Lunatic Asylums in Ireland*, fol. [1855]. *Reports of the Commissioners in Lunacy*, 20th Report in 1866. *Builder Journal*, xvi, 293, 371, 597; (Scotland) xvii, 721; xviii, 3; xix, 299; xxiii, 492; and xxiv, 457, contains articles more or less founded on the above reports, and have been consulted for these remarks. An account of a village devoted to the reception of insane persons at Gheel in Belgium, is given in a pamphlet entitled *Gheel, the City of the Simple*, 8vo., London, 1869.

LUND (the ancient Lindunum Gothorum). A very ancient town near Copenhagen in Sweden; in the middle ages it was the seat of an archbishopric. It is very irregularly built, occupies a large extent of ground, and presents an antiquated appearance. The site of the walls is planted with trees.

The cathedral dedicated to S. Laurence, was erected 1072-85 by Donatus, an Anglo-Saxon architect, for Knut IV, after the model of Dinton church, Buckinghamshire; and was consecrated 1 Sept. 1145. It is a large irregular edifice, but one of the most remarkable churches in the north of Europe. It consists of a nave, aisles, transepts, a choir with circular apse, two towers at the west end, and a large crypt under the transepts and choir, with a square well in it, the carvings of which date 1418. Repairs, especially to the north aisle, were effected 1513-27 and later by A. van Duren in the Pointed style; the south transept was being rebuilt 1858. The altar stands high; the carved stalls with rich canopies show a mixture of Gothic and Lombardic work, as stated by WESTWOOD, in the *ARCHÆOLOGICAL Journal*, 1859, xvi, 236-8. The pulpit is of alabaster inlaid with marble. It is about 245 (Swedish) ft. long and 90 ft. wide internally. Views of the exterior of the early apse and interior of the crypt are given in MARRIAT, *One Year in Sweden*, 8vo., London, 1862, i, 36-56; the former also in FERGUSON, *History*, 8vo., London, 1867, i, 656.

There are now only two other churches (before the Reformation there were twenty-one and six monasteries). The university founded 1479 occupies the building called Lundagard, a palace erected by Frederick II; it has a library of nearly 60,000 volumes and MSS.; with an observatory, various good museums, etc.; and is attended by four to five hundred pupils: there are also the consistory; the cathedral school; the town house; and the Nosocomium or infirmary. BRUNUS, *Beskrifning*, 8vo., Lund, 1836, with plates of the cathedral. DUNHAM, *Denmark*, 12mo., Lond., 1847, iii, 42. 24. 28. 50. 68.

LUNENSE MARMOR, see CARRARA MARBLE; and LUNA.

LUNETTE. A French term applied to an arched aperture cut in the side of a large vault and of a less height than the pitch, for the purpose of admitting light; BREES, *Gloss.*: it has sometimes been defined as an aperture in a concave ceiling for the admission of light. In France the term is also given to a small opening in a roof, or a timber spire, for ventilation; and to the hole cut in the seat of a privy; also to the opening left in the groined vaulting of a belfry to allow the passage of the bells from the ground to the cage. 1. 2. 5. 10. 19.

The term is applied to the semi-dome, in mosaic work, over the high altar in the basilica of S. Clemente at Rome, by GRUNER. *Ornamental Art*, fol., Lond., 1850, pl. 37; and also to the apsis of S. John in Lateran, pl. 38.

LUNGHI, LONGHI, LONGO, or LUNGO (MARTINO), born probably 1535 according to LETAROUILLY, p. 133, at Viggiu or Vigiù, in the province of Como, was working as a mason before he removed to Rome, where about 1565 (according to the same author, pp. 609 and 617), he built for cardinal Federico Cesi (who died 1565) the Cappella Cesi, now Massimi, marked *n* in LETAROUILLY's plan, pl. 304, of the church of Sta. Maria Maggiore. The fontana di Trevi, altered 1735 by N. Salvi, was constructed by him, probably upon the design of Vignola and immediately after the completion 1568 of the aqueduct

called the Acqua Vergine: another fountain, with four sea-horses, in the Vigna Altemps (now the villa Borghese), is his work. The tribune, and a ciborio with four porphyry columns, for the church of S. Bartolommeo all' Isola, which have been attributed to this architect, as also the staircase in the palazzo Ruspoli, should be ascribed to his grandson Martino. That younger Lungchi has erroneously the credit of the front of the church of Sta. Maria dell' Orto in the Trastevere: it was part of the work done (about 1570 is the conjecture of LETAROUILLY, p. 133) in repairing, if not rebuilding the hospital, to G. (Pippi) Romano's church, by this elder Martino, whose name appears on the plates of it given in FALDA, *Nuovo Teatro*, iii, 36; and in ROSSI, *Insignium Romæ Templorum*, fol. Rome, 1684, pl. 67.

He continued the palazzo Altemps between the piazza di S. Apollinare and the piazza Fiammetta, commenced by B. Peruzzi; FERRERIO, *Palazzi*, fol., Rome, (1655), pl. 61-2: LETAROUILLY, p. 368, pl. 169-170, gives a plan and section with (p. 133) a conjectural date 1570. The palazzo Sciarra Colonna di Carbognano is shown in FALDA, *Palazzi*, ii, pl. 36, with his name; and that print states that the *portone* to it was taken from a design by A. Labacco; but LETAROUILLY, pp. 127 and 326 (although allowing that the front which he shows, pl. 143, exhibits the style of the sixteenth century, and was restored about 1600) follows MILIZIA in giving this façade to F. Ponzio (about 1600); and supposes the *portone* to be an addition 1600-40: according to the *Handbook* the palazzo Sciarra "was built in 1603 by F. Ponzio, with a marble Doric doorway attributed to Barozzi"; it is sometimes ascribed wholly to Vignola, from whose directions Martino may have constructed it.

Under Gregory XIII (1572-85) the portico of eight columns added by Eugenius III. (1145-53) to the basilica of Sta. Maria Maggiore was "taken down and more magnificently restored" according to an inscription given in LETAROUILLY, p. 610, who also, p. 619, shows the front as it existed till altered 1743 by F. Fuga, being the work ascribed by BAGLIONE and PASCOLI to Lungchi in 1575. This architect appears (LETAROUILLY, p. 726) to have rebuilt the campanile, about 330 ft. high, to the palazzo del Senatore in the campidoglio; to have executed that part, of the palazzo on Monte Cavallo, which is called the Torre de' Venti; and to have put (1582, LETAROUILLY, p. 165) the façade to G. della Porta's church of S. Atanasio de' Greci, shown in FALDA, iii, 19; in ROSSI, *I. R. T.*, pl. 62, and in ROSSI, *Nuovo Splendore*, fol., Rome, 1688, iii, 9. To the same time, probably, belong the cappella Olgiati, in the church of Sta. Prassede, given by LETAROUILLY, p. 674, pl. 329; the cappella del S. Sacramento to the church of S. Marco in the Trastevere; and the palace of cardinal Santa Severina at Monte Citorio.

Under Sixtus V (1585-90) he designed the façade in two Orders, of the church (by G. Fontana, GWILT) of S. Girolamo degli Schiavoni (S. Hieronymus de Dalmaticâ) at the porto di Ripetta, ROSSI, *I. R. T.*, pl. 66; the name of S. Giovannino degli Schiavoni, probably an error for this work, sometimes occurs. About 1585 the church of Sta. Maria della Consolazione was rebuilt by him, and he erected its high altar; but he left unfinished the upper Order of the façade, which was completed about 1830 by G. Valadier; LETAROUILLY, p. 135; 333, pl. 150, gives the plan. The palazzo Conti or di Poli, near the fontana di Trevi, ascribed to him, is probably the palazzo del duca di Ceri, erected by him 1586 at the fontana di Trevi according to FERRERIO, pl. 19-20, who shows a front with nineteen windows in each story. As M. da Castello, who commenced about 1575 the church of Sta. Maria and S. Gregorio, otherwise called Sta. Maria in Vallicella, and still known as "la chiesa nuova" for the Padri dell' Oratorio, is not mentioned after 1585, that year was probably the date of Lungchi's employment (apparently in consequence of his favour with the Cesi family) to continue and complete internally this church, which was consecrated 13 May 1599; LETAROUILLY, p. 250, pl. 109, gives the plan, and states that a design in two Orders

by Lunghi for its front was engraved, but that a different one was designed by F. Rughesi; it was executed by G. Guerra, who had also superintended the erection of the church: and likewise Rossi, *I. R. T.*, pl. 29, shows Rughesi's front, but 30, Lunghi's interior: the decoration was finished by Borromini: MILIZIA states that Rughesi executed Lunghi's design for the façade.

After 1590 he erected for cardinal Dezza a palace shown with a range of nine windows in its principal front by FERRERIO, pl. 22, who, 66-8 exhibits a similar design with thirteen windows as the central portion of front to the palazzo Borghese: this is explained by LETAROUILLY, p. 376, pl. 175-6, giving the plan, façade, and section, as well as a view of the cortile, who states that the Dezza palace has been known as the palazzo Borghese ever since it was purchased by Paul V (1605-21) for his brothers, and that they commissioned F. Ponzio to add to Lunghi's side façade the left wing from the pilaster between the thirteenth and fourteenth windows as far as the via di Ripetta. He commenced 1594, LETAROUILLY, p. 136, the Servite church of Sta. Maria in Via, finished about 1670 by C. Rainaldi, Rossi, *N. S.*, iii, 11: GWILT, however, attributes the whole edifice to the latter architect. The restoration (and enlargement 1596 according to LETAROUILLY, p. 136) of the palazzo Cesi in the Borgo Vecchio is ascribed to Lunghi; but GWILT states that the palace was entirely erected by F. Massari. His latest works seem to have been the restoration of one of the churches of SS. Vincenzo and Anastasio about 1600; and the façade of the church of the Convertite in the Corso, which he left with only the lower Order completed. The date of his death, in very old age, is not recorded even by those who state that he left children who were architects: one son, Onorio, is the subject of the following article: and Sylla Giacomo Lunghi, a sculptor who died at Rome about 1625, belonged to the family. LETAROUILLY, *Rome Moderne*, 4to. and fol., Paris, 1840, 3. 12. 38. 42. 62. 111.

LUNGHI (ONORIO), born 1569, was a pupil of his father MARTINO. He is said to have visited on business Naples, Bologna, Ferrara, and some parts of Tuscany. He is mentioned in the list of artists employed about 1600 during the episcopacy of cardinal Federico Borromeo, on the duomo at Milan: his design for a new façade is still preserved; and he was engaged on the works of the church of Sta. Maria presso S. Celso in that city. Apparently this was in the lifetime of his father whose clients had employed Onorio previously to the journey; because, while still a youth, he executed the gateway to the vigna Altemps (now the villa Borghese), outside the Porta del Popolo; and the loggia Olgiati in the piazza Fiammetta. Probably that was also the period in which he constructed for cardinal Santa Severina the cappella Santori (afterwards Ceva, now Godoy) of an Ionic Order in the church of S. Giovanni Laterano, on an oval plan, shown in LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 485, pl. 224: made the high altar for the chiesa del Madonna di Loreto in the piazza Trajana: and put the high altar with four porphyry columns, and the coro to the basilica of S. Paolo fuori delle mura, burnt 1823. The death of his father seems to have drawn Onorio back to Rome to continue the works of the palace for the duca di Altemps: contemporaneously he erected the palazzo Ferrini in the piazza di Pietra: he also did the palazzo Verospi (FERRERIO, *Palazzi*, pl. 93) in the Corso, subsequently altered by A. Specchi, according to LETAROUILLY, p. 160, pl. 16, who gives an elevation; only the gallery, the loggia, and the cortile are ascribed to Onorio by MILIZIA and others, who state that the palace is by G. Rainaldi. About the same time he designed a chapel in the church of S. Silvestro on the Quirinal hill; and the altar of the church of S. Eusebio rebuilt 1750 by N. Piccioni. To the palazzo Lante in the piazza de' Caprettari he added the elevation above the second string-course of the front already executed (? by Sansovino) to a plan that is attributed to Bramante, according to LETAROUILLY, p. 349,

pl. 153, who gives the plan and façade of this building, which was restored 1760 by C. Murena. He commenced 29 January 1612 the church of SS. Ambrogio and Carlo Borromeo in the Corso; Rossi, *Insig. Romæ Temp.*, fol., Rome, 1684, pl. 52-4; LETAROUILLY, p. 472, pl. 222 gives the plan: a large print showing the plan with the name "dominor' de Longhis" is in *Bib. Reg. Mus. Brit.*: the son Martino continued the edifice. A print from a wood block records Onorio's design of an arch erected for the ceremony of translating the heart of S. Carlo. His church of Sta. Maria Liberatrice in the Campo Vaccino is given undated in FALDA, *Nuovo Teatro*, iii, 27; and in Rossi, *Nuovo Splendore*, fol., Rome, 1688, iii, 22; but LETAROUILLY, p. 137, dates it 1617. He also executed the high altar in the church of Sta. Anastasia at the foot of the Palatine Hill, rebuilding the portico of that structure; the cappella Mantica and its altar in the church of Sta. Maria in Araceli; the Crescenzi tomb in the church of S. Gregorio on the Celian hill, rebuilt 1725 by G. A. Serradini; and a niche as well as the baptistery in the church of Sta. Maria in Trastevere.

He became a member of the academy of S. Luke at Rome, and a doctor of laws; his death, 1619, is recorded by an epitaph under the loggia of the cortile annexed to his church of S. Carlo. 3. 12. 27. 31. 38. 42. 62. 68. 111. 112.

LUNGHI (MARTINO), born probably after 1590 at Rome, was a son and pupil of ONORIO. He visited Sicily, Naples, Milan, and Venice; and constructed in the palazzo (of cardinal Ginetti now) Lancellotti at Velletri the staircase shown in the *Illustrations*, 1850, pt. 1, 37: another, (criticised by MILIZIA) executed by him in the palazzo (of cardinal Gaetani, now) Ruspoli, built by Annanato in the Corso at Rome, is sometimes attributed to his grandfather Martino, whose front of the church of Sta. Maria dell' Orto in the Trastevere is wrongly ascribed to this Martino.

About 1616, or somewhat later, Martino returned to Rome, where he continued his father's church of SS. Ambrogio and Carlo Borromeo, LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 472; adding the high altar: but the tribune, transept, cupola, and interior decorations were designed by P. Berretini (1596-1669), Rossi, *Insig. R. Temp.* fol., Rome, 1684, pl. 52-4; and the façade 1690 by G. B. Menicucci with M. da Canepina according to MILIZIA *in v. C. Rainaldi*. The restoration of the church of S. Bartolommeo all' Isola, with its new front and the high altar, at the expense of cardinal Giulio Santorio, are assigned to this Martino by LETAROUILLY, p. 358: the tribune, and a ciborio with four porphyry columns, are wrongly attributed to his grandfather; for TITI, p. 47, states that they were done by the same architect who embellished some of the chapels and executed the front for cardinal Tonti, and notices that the funds for the soffitto and portico were supplied 1624. The portal to the villa Odescalchi was designed by this younger Martino. He wrote 1645 a memoir in favour of retaining Bernini's campanile to S. Peter's, which, however, was destroyed 1647: between 1641 and 1648 (although LETAROUILLY, p. 138, says 1650) he constructed, at the expense of cardinal Mazarin, the church of SS. Vincenzo, Anastasio, and Girolamo, opposite the fontana di Trevi, FALDA, *Nuovo Teatro*, iii, pl. 25; a large print showing this façade and its plan is in the *Bib. Reg. Mus. Brit.*: and about 1652, according to LETAROUILLY, p. 138, he built the church of S. Antonio de' Portoghesi. The restoration of the church of S. Adriano at the north-east corner of the Foro Romano appears to have been his last work. He died 1657. 3. 12. 38. 42. 111.

LUPICINI (ANTONIO) rebuilt 1543 the church of SS. Jacopo e Lorenzo at Florence.

LUPUS (C. S.), see SÆVIUS LUPUS (CAIUS).

LURAGHI (ANTONIO), born near Como, was also a sculptor, practising 1650-71: he was a pupil of Avanzini, whom he succeeded as architect to the duke of Mantua, continuing the work of his master in the palaces of Sassuolo and Modena:

CAMPORI, *Gli Artisti negli Stati Estensi*, Svo., Modena, 1855. 112.

LURAGO (GASPARE DE), is mentioned under the date 14 September 1399 as engaged upon the works at Milan cathedral. 27.

LURAGO, LORAGO or LURAGHI (ROCCO), was born early in the sixteenth century at Pelsopra, or Plespora, a village near Como. He designed about 1551 for the Grimaldi family the palazzo Doria Tursi in the Strada Nuova at Genoa, much criticised by MILIZIA; it subsequently became the palazzo municipale, and since 1838 the collegio dei padri Gesuiti (*Illustrations*, s.v. Genoa, pl. 80, shown on the left hand in the sketch); it is given by GAUTHIER, *Génes*, fol., Paris, 1830, pl. 29-32. By order of Pius V (1566-72) he designed at Bosco, the birth-place of that pope, the Dominican church and monastery. He died 1590 at Genoa. 3. 68. 112.

LURAGO, LORAGHO or LORAGO (CARLO), of Fermo, practised 1638-79 at Prague, where he seems to have been employed, after D. Miseron but before A. Gunz, on the imperial-royal residence called 'der burg.' He designed 1662 the priory of the Maltese knights close upon the bridge; and 1673 its church. The latter structure, which has a coppered dome, is mentioned by SCHALLER, *Beschreibung der Stadt*, Svo., Prague, 1794-7, ii, 189; who notices iii, 30, the mansion of count Thun in the Kleinseite, one of the best works by this architect. TSCHISCHKA mentions a palace of count Thun in the Neustadt. 20. 26. 68.

LURAGO also called LORAGO (JOHANN ANTON), practised at Prague, where he died 9 June 1727 in his sixtieth year, according to the register of the parish of S. Wenceslaus in the Kleinseite. 20.

LURAGO or LURAGHO (MARTIN), with Dominik de Orsis, erected the Carmelite monastery, which was commenced 21 November, 1671, near the church of S. Gallus in the Alt Stadt at Prague. BECKZOW, *Bohm. Chron.*, ii, 1406. 20.

LURAGO or LURAGHO (ANSELMO), designed at Prague the königliche Theresianische damenstift in the Hradschin 1755; the (Golz afterwards) Kinsky palace, and the (Piccolomini afterwards) Johann Nostitz palace, both in the Neustadt; and his own house near the Waelche-spital in the Altstadt. 20.

LURIN. A village situated five miles south of Lima, in the broad valley of Lurin, called Pachacamac prior to the Spanish conquest, when it was one of the most populous parts of the coast of Peru. Pachacamac was the greatest deity of the Yuncas, who did not worship the sun until after their subjugation by the Incas; the temple was then dedicated to the sun and the idols destroyed. In 1534 Pizarro invaded the village and destroyed the temple, the ruins of which are among the most interesting objects on the coast; they are situated on a hill about 558 ft. high on which stood the temple, the summit is overlaid with a solid mass of brickwork about 30 ft. high enclosed by high walls rising in the form of an amphitheatre: it is now a mass of ruins, all that remains being some niches. At the foot on the sides of the hill are the vestiges of habitations. The whole was encircled by a wall 8 ft. thick; some portions still (1838-42) 12 ft. high exist. TSCHUDI, *Travels*, translated by ROSS, Svo., Lond., 1847, p. 204-5.

LUSARCHES (ROBERT DE), also written Leuzarches and Luzarches (TICOTZI spells it Lurasche), designed 1220 the cathedral at Amiens; VIOLETT LE DUC, *Diet.*, i, 109; ii, 325. DALY, *Revue Générale*, 4to., Paris, 1840, i, 194, speaking of the pavement of the cathedral, notices that "In the midst of a labyrinth called in the middle ages 'the house of Dædalus', which an incredible barbarism has (1840) recently destroyed, there was an octagonal bluish stone on which had been incrustated four small effigies of white marble representing a bishop and three architects mentioned in the following inscription (not legible in 1837, WINKLES, *French Cathedrals*, 4to., London, 1837, p. 6), engraved upon a plate of copper": the inscription has been published, with some errors, by LA-

MORLIÈRE, *Antiquités d'Amiens*; but the following is given from GILBERT, *Description*, Svo., Amiens, 1835, p. 138, copied from an ancient cartulary of the cathedral preserved in the archives of the department. He says that the effigies were on a sheet of copper.

| | |
|---------------------------------|-----------------------------------|
| En lan de grace mil ii c. | Et de Lusarches surnomes |
| Et xx fu loeuvre de cheens | Maistre Thomas fu apres luy |
| Premierement encoimenchie | De Cormût, et apres sen filz |
| A dont y ert de cheste Evesquie | Maistre Regnault qui mestre |
| Evrart Evesque benis | Fist a ches point chi cheste |
| Et Roy de France Loys | leltre |
| q. fu filz Phelippe le Sage | que lincarnacion valoit |
| Chil q maistre y ert de loeuvre | xiiij c. aus moins xii en faloit. |
| Maistre Robert estoit nomes | |

DUSEVEL, *Notice de N.D.*, transl. by S. Ferguson, jun., 12mo, Amiens (1860), p. 11. DALLAWAY, *Discourses*, Svo., London, 1833, p. 167, states that "Stephen de Lusarche began the cathedral, which was completed by Robert de Lusarche in 1222," but does not give any authority.

LUSSAULT (PIERRE MARIE), born 1785 at Paris, was a son and pupil of his father, a student in the French academy at Rome. He was further educated in the school of architecture at Paris. His chief works are at Lorient in Morbihan, where he was architect to the town: viz. 1808 the principal gate of the naval arsenal; 1811 the fountain in the place S. Louis; 1821 the marché à la viande; 1822-29 the greater portion of the parish church; 1824-28 the collège; 1824-5 the prison and maison d'arrêt at a cost of 157,000 francs, given in GOURLIER, etc., *Choix d'Edifices*, fol., Paris, 1837-44, i, pl. 65-6; the fish market; 1826 the chief office of the octroi; the abattoir; 1829 a tomb in memory of Bisson (receiving a silver cup from the duchess de Berri on laying the first stone); a tomb to Cadoudal at Auray; with many designs for improvements not executed. In 1813 he received a gold medal from the academy at Antwerp for a design for the plan of a custom house and warehouse. The *Notice sur le défunt J. D. Antoine*, Svo., Paris, 1804, was probably by him. The date of his death is not recorded. 110.

LUTE. A composition of clay used for closing the mouth of vessels and the joints of pipes to prevent the escape of air, gas, or liquid. Melted lead, red lead putty, and other lutes, are also used for the same purpose in metal work. LUTUM; IRON CEMENT. A mixture of finely ground litharge and concentrated glycerine (even if coarse) made into a paste, and applied to corks is a very efficient lute.

LUTEA, LUTUM, and LUTUM, usually but incorrectly translated woad, are respectively used by PLINY, *H. N.*, xxxiii, 5; by VITRUVIUS, vii, 14; and by VIRGIL, *Ecl.*, 4, for a plant, which was employed instead of chrysocolla for a yellow pigment, being also the 'luteola herba folio salicis' according to BACCHINUS.

LUTEON. A term used in MOXON, *Mechanick Exercises*, Svo., London, 1693, p. 143, for "a single light window"; showing in the figure a wide garret window divided by mullions into three divisions, each called a "luteon", which may be a misprint for luteon or luthern.

LUTETIA. The Latin name of PARIS, in France.

LUTEVA. The ancient name of LODÈVE, in France.

LUTHERN. A term used in and from the seventeenth century, being a corruption of LUCARNE.

LUTUM. The word used by VITRUVIUS, ii, 1, where he describes the use of clay for plastering (as WATTLE AND DAB), for making walls (as a sort of COB) between quartering and plates; and for forming a sort of PUDDLING upon roofs made of reeds and leaves.

LUTZ (JOHANN), born at Schussenried in Würtemberg, commenced 1501 and completed 1519 the tower of the church at Botzen in the Tyrol, according to an inscription thereon; where his portrait is also to be seen. 26. 68.

LUX (. . .), succeeded Vincenz 1499 on the works of the cathedral at Colmar, in France. 92.

LUXEMBURG (It. Luceburgo; Ger. Lutzenburg). A small town belonging to Holland, the capital of the duchy of the same name, and since 1815 one of the fortresses of the German Confederation. Its natural position together with its means of defence improved 1684, 1697, 1713, 1826, and 1835-8, rendered it the strongest place in Europe after Gibraltar. The most remarkable part of the fortifications is the *bock*, a rocky peninsula formed by the river, united to the upper town by a stone bridge of five arches superposed on a massive arch which spans the valley commanded up and down by this rock which is covered with loop holes and embrasures. The fortifications were arranged by the powers of Europe 1867 to be destroyed. It is divided into a low and a high town; the former on the banks of the river Alzette is surrounded with walls and consists of two quarters called the Grundel and Pfaffenthal; the latter, forming the citadel, stands 200 ft. higher and is approached by steps and zigzag streets cut out of the rock, which is surrounded by a strong wall, deep ditches, and a double row of formidable outworks; this part is about 1950 ft. long by 1350 ft. broad. The whole town is well built with many good mansions of the leading families, and contains three good public squares. At the corner of the fish market is *la maison sous les arcades*, an old building; and some curious bas-reliefs are incrustated in a wall in the *rue de la Trinité*. The town is the see of a bishopric.

The cathedral dedicated to the Virgin, was erected in the sixteenth century by the Jesuits; there is a public library of 30,000 volumes, and a museum of antiquities, etc. In the lower town is an ancient chapel of S. Quirinus hollowed in the rock. The abbey of Vieux Munster on the *bock* was destroyed 1541 by Charles V, but having been rebuilt 1597, it was burnt 1684, and rebuilt 1690. Besides the old and ruinous monasteries of the Dominicans and Franciscans; the buildings deserving notice, are the church of S. Nicolas founded 1120 and rebuilt in the eighteenth century; S. Peter's, the old church of the Jesuits; and a synagogue. The old town house, and the new one, erected 1830; the governor's house; the marshalsea partly used as a theatre; the *athénée* formerly the Jesuit college; a Roman Catholic seminary and several schools, comprise the other chief buildings. WEALE, *Handbook to Belgium*, etc., 8vo., London, 1859. 28. 50.

LABORDE, *Monumens de France*, fol., Paris, 1816, i, pl. 100, gives antique bas reliefs and fragments built in the walls of the old château de Mansfeld, which are of the same age as those on the tomb at Ijel, a few leagues distant, given by HAWICH and NEUBER, *Abbildung des Römischen Monuments in Ijel*, fol., Treves, 1826. The villa or the château de Clausen at Eich, near the city, erected 1563 for the count Peter Ernest von Mansfeld, celebrated for its gardens and terraces, had its works of art removed to Bruxelles and Madrid after the death 1609 of Philip II, and was so nearly demolished 1560 and 1684; that there now only remain a fragment of the south façade and the entrance gates. WAUTERS, *Belgique*, 8vo., Bruxelles, 1846, p. 392-6.

LUXOR, in Egypt, see THEBES.

LUZIANO (GIANFRANCESCO), was employed about 1600 as chief military engineer by Ferdinand II Gonzaga duke of Mantua. He altered the palazzi Valenti, Andreasi, and Guerrieri, and others in that capital. 57.

LUZY (. . . DE), a member of the Academy of Architecture at Paris from 1734 to 1737; was one of the eighteen architects who made a design for the *place du Pont Tournant* at Paris, afterwards the *place de Louis XV*.

LOWOW. The Polish name of LEMBERG, in Galicia.

LY. A Chinese measure of length; see LI.

LYCEIUM (Gr. *λύκειον*). A gymnasium dedicated to Apollo Lyceus, and surrounded with lofty plane trees, situated at the east end of Athens. It was the chief of the Athenian

gymnasias, decorated by Peisistratus, Pericles, and Lycurgus; and was the place in which Aristotle and his disciples taught, who were called 'peripatetics' from their practice of walking while delivering their lectures. 69.

LYCEUM. A name, that has been sometimes adopted on the continent for buildings devoted to educational purposes, derived from the Gr. *λύκειον*. Its modern use seems to date from 1802 when Napoleon, settling the organisation of public education, replaced the *écoles centrales* of the Convention by *lycées* in which masters, salaried by the state, taught literature and science excluding philosophy: these *lycées* with the *écoles communales* forming the university. Apparently the *athénées* included religious instruction. In 1807 the former lyceums were denominated *athénées*, and the forty *collèges impériaux* formerly termed *athénées* were called lyceums: they did not exact residence; but any ecclesiastical *seminaire* which did not require it was closed. The lyceums did not confer a degree; but they resembled a British high-school. Some time before 1843 the term expired in France: but was retained in Italy; as at Verona where, in 1846, the *ginnasio* in the (formerly) Jesuit college was a school for little boys, and the *liceo* in part of the (former) Dominican monastery of Sta. Anastasia had five hundred older pupils.

LYCH GATE, see LICH GATE.

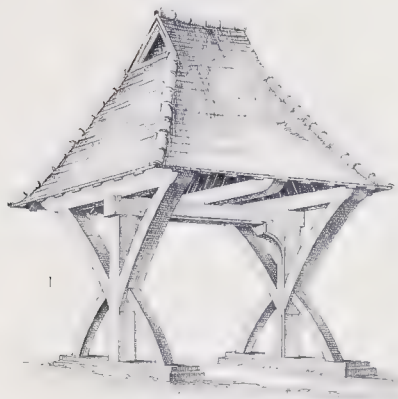
LYCHNOSCOPE. A name formerly given to a Low side window.

LYCIA. The valley of the Nanthus in the southern portion of Asia Minor. Its inhabitants changed their name from Milyæ to Solymi (the name Mons Solymi, now Takhatlu, remained), to Termilæ after Sarpedon of Crete settled in the country, and to Lycii from Lyeus, a son of Pandion expelled by his brother Ægeus from Athens: unconquered by Cræsus, they submitted to Cyrus. Xanthus, Sataros or Patara, Pinara, Olympus, Myra, and Tlos, were the chief cities: Phaselis founded by the Dorians, Telmissus, and Limyra, were important towns: the situation of Pinara is doubtful, but the place assigned to it on the maps, at Doover, was the site of Tlos. Before 1838 travellers had not made known the existence of a peculiar architecture that is dated (very conjecturally) 550-450 B.C. by FERGUSSON, *Illustrated Handbook*, 8vo., Lond., 1855, i, 209; which is not classified with any of the leading styles of art; and which in its late examples becomes absolutely Greek. The tradition of direct imitation in stone of timber construction is not so well substantiated by the monuments in any country as by the tombs in Lycia. If some of them, exhibiting terraced or gabled roofs, have any similarity to the tomb at Benihasan, they still exhibit a Greek character as much as those which indicate a relation to the buildings shown in the sculptures at Kouyunjik: while the long frames of panels without any bottom rails are as much Assyrian as Egyptian. Whether or not this roofing be earlier than that which exhibits the middle of the length of a boat with the keel upwards as the form of the covering, it had carpentry for its origin as distinctly as the other, which seems to perpetuate a (perhaps two-storied) sanctuary or ark lashed at its base to the poles by means of which it was transported. The boat-roof tombs are distinguished from the others as 'Gothic' from 'Elizabethan' ('curvilinear' from 'rectilinear' would have been more technical), by FELLOWS, *Account of Discoveries in Lycia*, 8vo., Lond., 1841: his illustrations, with others in TEXIER, *Asie Mineure*, fol., Paris, 1839-49, are supplemented in SPRATT and FORBES, *Travels in Lycia*, etc., 8vo., London, 1847, whose theory that these tombs are attributable to the Persians is combated in the *ECCLESIASTIC Journal*, 8vo., Lond., 1847, iii, 1-15. DALY, *Revue Générale*, 1857, xv, 14-8.

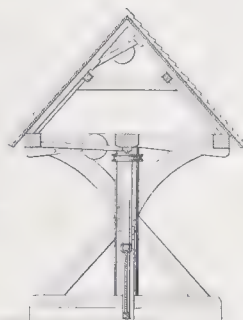
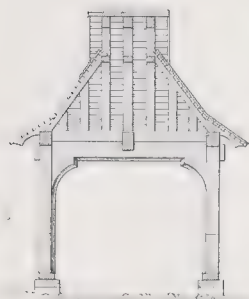
LYCOPOLIS, in Egypt; now represented by SIOUT.

LYCOSURA. An ancient town of Arcadia, in the district of Parrhasia, between Megalopolis and Phigaleia. Its remains were first discovered by DODWELL, *Tour through Greece*, 4to., London, 1819, ii, 395, near the village of Stala, and have

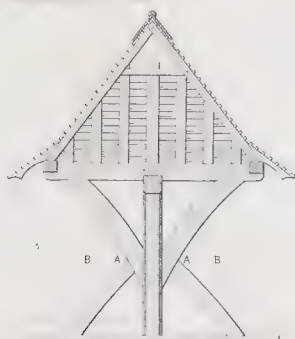
LYCH-GATE



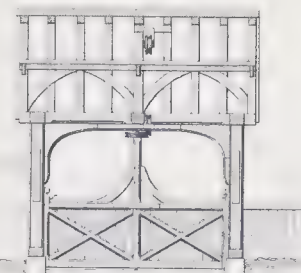
BECKINGHAM
originally that it had no design



HESTON



Beckingham
Timber & Slaten



HESTON



HESTON, Middlesex



LICH-GATE



Fig 1 WEST WICKHAM, Kent



Fig 2 GARSINGTON, Oxfordshire



Fig 3 BOUGHTON MONCHELSEA, Kent



Fig 5 MOORWINSTOW, Cornwall



Fig 4 LENHAM, Kent

Fig 5 E. Ashworth

Figs 1 to 4, J. Drayton Wyatt, M.R.I.B.A.



been described by Ross, *Reisen im Pelop.*, p. 87. It is called by PAUSANIAS, viii, 2, the most ancient town in Greece, and was in ruins in his time. A general view is given in DODWELL, *Cyclopiæ Remains*, fol., Lond., 1834, pl. 1. BLOUET, *Morée*, fol., Paris, 1833, ii, 40, pl. 35, shows a plan of the locality, and notices a chapel of S. George, which gives the modern name of the place. 59.

LYCTUS or LYTTUS. One of the most considerable ancient cities in Crete; the site still bears the name of Lytto, where numerous vestiges of structures, tombs, and broken marbles are still seen, as well as the immense arch of an aqueduct. ECHERIA. FALKENER, *Museum of Classical Antiq.*, 8vo., Lond., 1860, ii, 274.

LYDIA. This term is generally understood to mean those two great valleys of Asia Minor, which are drained by the Hermus and the Caystrus. The inhabitants were called Mæonii or Mæones, afterwards Lydii (from Lydus son of Atys), but the Mæonian name remained in the valley of the Hermus. The Lydians had the same origin as the Mysians and Carians. The Atysæ till 1221 B.C., and the Heracleide 1221-716 B.C., are almost fabulous; the princes called Mermonadæ were Gyges 716, Ardys 678, Sadyattes 629, Alyattes 617, Croesus 560-556 B.C.; 704, 666, 617, 605, 548-535, are proposed as more correct dates in the *ATHENÆUM Journal*, 1861, pt. ii, 190. When their chief city Sardis was burnt 503 B.C. by the Athenians, the houses were principally made of reeds or straw, and those built of brick had thatched roofs. If discoveries should be extended to the tomb of Alyattes and other sepulchres near the Gygean lake, they may determine whether or not the princes above named ruled the nation of Leleges, who are placed in various parts of the map of the western and southern shores of Asia Minor, but who seem to have been driven inland by the Greek colonies; and whether or not their dominion expired with the construction of the last of the Etruscan tumuli in Asia Minor, or is commemorated in the rock sculptures at (Doganlou) MIDÆUM: of which latter works FERGUSON, *Illustrated Handbook*, 8vo., London, 1853, i, 208, affirms that "judging from their inscriptions, and the traditions in Herodotus, they seem to belong to some Indo-Germanic race from Thessaly, or thereabouts, who have crossed the Hellespont and settled in their neighbourhood; and their date is possibly as far back as 1000, and most probably before 700 B.C." He does not notice any affinity to Assyrian or Babylonian work, but considers that the later ones "have pillars of a rude Doric Order." Examples of these peculiar shaped monuments of art are to be seen in the Lycian room in the British Museum. STEWART, *Ancient Monuments in Lydia and Phrygia*, fol., London, 1842.

LYDIAN MARBLE. A material used in Sta. Sophia at Constantinople, described by PAULUS SILENTIARIUS, as "pale with a red flower." GIBBON, *Decline*, 8vo., London, 1854, iii, 334.

LYDIAN STONE, also termed black chert. An impure flint of a dull colour approaching to black; found in the central portions of the carboniferous limestone of Ireland, and at the base of the Kilkenny coal formation. It has not the same translucency, and does not chip into conchoidal fragments so readily, as flint, but it is more opaque, brittle, and stone-like. Next to flint, it is one of the hardest of the siliceous rocks; and therefore was occasionally used for tools and weapons in districts where flint was rare. A few beautiful specimens, particularly those numbered 207 and 286, exist in the museum of the Royal Irish Academy; as noticed by WILDB, *Catalogue*, 8vo., Dublin, 1857, p. 11, 12. This author further observes that "Lapis Lydius, or, as it was denominated by the old Dutch writer, DE BOOT, so long ago as 1647, *Lapis Hibernicus*, is the true touchstone of the ancients, and its power of gold-testing can be exhibited in these specimens of arrow and spear-heads; yet it is remarkable that, although there are several other stone implements preserved in the collection equally capable of testing the purity of gold, and apparently serving no

other purpose than that of touchstones, we do not find among them a single specimen of Lydian stone." On p. 49, he notices that it is a siliceous rock abundant in the neighbourhood of Keelogue (on the Shannon), and Banagher.

Near the tombs of kings Henry III and V in Westminster abbey, is a small table monument covered with a slab of black Lydian, finely polished, in memory of Elizabeth Tudor, second daughter of king Henry VII, who died at Eltham, 4 Sept. 1495. SROW, edit. by Seymour, fol., Lond., 1735, ii, p. 506.

LYING-IN HOSPITAL. A building erected to receive, previous to child labour, females who are there nursed through it or while ill. There are nine such institutions in London founded from 1749 to 1829; the one in Dublin 1745 was the first of the sort opened in the British dominions. Dr. OFFERT in *BUILDING NEWS Journal*, 1868, p. 271-2, describes the plan of a "Maternity, with a design for a lying-in hospital and midwifery college", stating that it unites the advantages of the hospital system with those of a domiciliary maternity. A room is provided for each woman; it is large, and exposed to free circulation of air: a gallery in front and behind is intended to be open the greater part of the year. The passages having 4 ft. less elevation than the rooms, it is possible to place separate top windows above them. The infirmary, a kitchen, a ward for puerperal fever, and a convalescent ward, form separate blocks all communicating by galleries, more or less open, with the reception rooms, labour room, etc.

A second, the Imperial, lying-in institution in S. Petersburg, contains about thirty beds; it "may be better compared to the lying-in chamber of a great lady than to an hospital—intended for married women in indifferent circumstances; about 500 to 600 patients apply for admission in the course of the twelve months"; GRANVILLE, *St. Petersburg*, 8vo., London, 1835, ii, 293.

LYING PANEL. A panel in which the fibres of the wood lie in a horizontal direction, such as was generally placed in the lower framing of a partition; MOXON, *Mechanick Exercises*, (Joinery), 4to., London, 1693, p. 106-10, pl. 7.

LY-MO. The ironwood of China.

LYMPIÆA. A sort of artificial grotto; see NYMPHÆA.

LYNAR (ROCHUS VON), a name of GUERINI (R.)

LYNDE (WILLIAM), was appointed 12 Sept. 1441 by king Henry VI with R. Kente and W. Waryn to be 'overseers' of his works at the building of Eton college, Bucks, with J. Hampton as 'surveyor': and was also 'clerk of the works.' Roger Keys was master of the works; and Robert Westerley master mason. BRITTON, *Arch. Antiq.*, 4to., Lond., 1809, ii, 89; TIGHE and DAVIS, *Windsor*, 8vo., London, 1858, p. 329, 331-5.

LYNGE or LING. A material used 1480-1 for covering the mill at Baxtanford "et adquisicione de le lynges;" SURTEES SOCIETY, *Finchale Priory*, 8vo., Newcastle, 1837, p. 350 and 436.

LYNGHOUSE. "Within the Fermery, under neth the master of the Fermeryes chamber, was a stronge prysonne call the lynghouse (lyngehouse, *Cos.*) the which was ordeyned for all such as weare greate offenders, as yf any of the mounckes (and those which were in holy orders, H. 45) had been taiken with any felony, or in any adulterie, he should have sytten ther in prysone for the space of one hole yere, in cheynes, without any company except the master of the Fermery (to see that he were strictlye looked to, according to the orders of the house, H. 45), who did let downe there meate thorough a trap dour in a (great, *Cos.*) corde, being a great distance from them (those who were in prison, *Dav.*) Other companye had they none. Yf any of the temporall men (officers, H. 45) pertynyng to the said house had offended in any the premisses aforesaid, then weare they punyshed by the temporal lawe (secular power, H. 45); SURTEES SOCIETY, *Ancient Monuments*, etc., of Durham, 1593, 8vo., London, 1842, p. 75.

LYNTERELLE. An old term for LINTEL.

LYNTON. An old orthography of the word LINTEL; as used in "ij lintons made for ij wyndowes"; BAYLEY, *Tower of London*, fol., London, 1824-5, pt. 1, app. xxii. 19.

LYON (Lat. Lugdunum; Engl. Lyons; It. Lione). The capital of the département du Rhône, and the second city of France. It is situated at the junction of, and between, the rivers Saône and Rhône, the opposite banks of which are united by means of twenty-one bridges chiefly of modern construction; the twelve over the Saône are, from south to north, two Railway, Napoleon, D'Ainay, S. Georges, Tilsit (stone, and considered the best), Palais de Justice, Du Change or Nemours (old, of stone), Feuillie, S. Vincent, one not named, Serin; and higher up Mouton, and La Gare: the nine bridges over the Rhône are, the Railway; Napoleon; Suspension; La Guillotière, cir. 1710 by J. Gabriel 1,617 ft. long (in place of the old bridge, dating from 1050 or 1190, shown in CHAPUY, pl. 6); Hôtel Dieu; Lafayette, formerly Charles X (wood on stone piers); Collège; Morand (from its architect, of timber); with S. Clair. The former pont neuf of timber on piles by Naugrez, master carpenter, is given in KRAFFT, *Art de la Charpente*, fol., Paris, 1805, pt. 3, pl. 11. The old portion has a wall on the south side between the rivers; the city is surrounded by eighteen detached forts, the most important being that of Pierre Encise, a state prison; a plan and description of them is given in *Papers of the Corps of Royal Engineers*, 4to., London, 1842, v. Of the extensive barracks, the caserne de la gendarmerie was designed 1828-30, by Hotelard and J. J. P. Gay (GOURLIER, etc., *Choix*, ii, 220-1). The streets in the old town are generally narrow and dirty with tall ungainly buildings, but in 1856-7 the rue Impériale and the rue de l'Impératrice were cut through it. No. 8 rue Juiverie is by P. de l'Orme, who designed others. Well-planted quays with regular and lofty houses, and capacious warehouses line the banks of both rivers. A new town has risen on the west bank of the Rhône called Les Brotteaux and La Guillotière. The place des Terreaux contains the hôtel de ville: the place Bellecour, now Louis le Grand, of fifteen acres, is considered unsurpassed in Europe; a bronze statue by Lemot of Louis XIV was replaced in its centre by Charles X; one of the sides of the place was designed by R. de Cotte; the place de Louis Napoléon has a statue of Napoleon I; and the place de l'Hippodrome has one side rebuilt since 1793. The monument to those who fell in the siege 1849, is by C. Cochet; and there is a statue to Marshal Suchet. Railways join this city with Paris and Avignon, the station by A. Cendrier being in the quartier Perrache: plans, etc., are given in DALY, *Revue Générale*, 1859, xvii, pl. 12-22; the Quarantaine bridge over the Saône was tested 3 October, 1856; it is 398.6 ft. long between the abutments and 27.8 ft. wide; and is built on cylinders on Bush's system, as detailed in *Building News Journal*, 1856, ii, 705.

There are many remains of Roman work, consisting of ruins of an amphitheatre; and of three aqueducts in the neighbourhood, (*Detached Essays*, Aqueduct, p. 13, including that of Mont Pila, more than thirty miles in length, pl. 3, figs. 6 and 9); they are described by TERNE (mayor in 1843), in a *Report* to the municipality; by FLUCHON, *Mémoire sur trois anciens Aqueducs*, 8vo., Lyon, 1842; and by POWNALL, *Notices*, 4to., London, 1788, pp. 154-82.

The cathedral dedicated to S. John the Baptist was erected about the end of the twelfth century; the upper windows of the choir are in the style ogival première; the portail and tower, style ogival tertiaire; the chapel of cardinal Charles de Bourbon (died 1590) is renaissance: LABORDE, ii, pl. 136, states it is composed of three ancient churches with a font in each, namely those of S. Etienne, S. Croix, and S. Jean. It has four towers, two at the west end, which dates 1462-83, and two at the transepts, the northern one is of the same period as the nave, the southern one is of the fifteenth century. The painted glass deserves notice. This "edifice is interesting as showing how hard it was for the southern people to shake off

their old style and adopt that of their northern neighbours", (FERGUSON, *History*). The clearstory presents an interesting series of windows from plain lancets to the perfect mullioned window, (PETIT). Two chapels are given in POLLET; the portail and the interior in CHAPUY, pl. 5 and 16. The ancient church of Notre Dame de Fourvières occupies the elevated site of the Forum vetus built by the emperor Trajan; the dome is surmounted by a colossal gilt statue of the Virgin: a view is given in CHAPUY, pl. 8: adjoining it is a tower or observatory 680 ft. above the Saône, designed by J. Pollet (pl. 48). The church of S. Nizier, 1300-15, in the flamboyant style, is one of the largest in the town; the renaissance portail, dating 1556, is by P. de l'Orme: this building is well illustrated in POLLET, pl. 7-19; a view in CHAPUY, pl. 13. S. Bonaventure, of the Cordeliers, a parish church, has a reredos 1864, with modern glass by Thibault of Clermont. The church of the Chartreux has a conspicuous dome. The church of S. Paul was rebuilt cir. 1103 (view in CHAPUY, pl. 7). Plans of the church of S. Just (the portail by De la Monce), of which the choir was restored cir. 1810 by J. J. P. Gay; of S. Louis on the quai des Augustins; of S. Cyr au Mont d'Or; and of S. Pierre, are given in LABLERE, *Recueil*, fol., Paris, 1826, pl. 55, 64. The churches, de l'Observance (a view in CHAPUY, pl. 14), and des Antiquailles, are also noticeable: that of the Jesuits was 1800 transformed by C. Cochet into the hall for the sittings of the assembly of the Cisalpine States, a view of that of S. Just is given in LABORDE, ii, pl. 18-9: that of the Jacobins 1674 was by J. Le Pautre; and the portail of that of the Carmelites 1682 by F. Dorbay, both of which have probably been destroyed. The church of S. Irénée (second bishop of Lyons) is a modern building; beneath it is a crypt, cir. eleventh century, in which the massacre of the Christians occurred A.D. 202; a plan and section is given in LABLERE, pl. 98.

Near the city is the church of the abbey of S. Martin d'Ainay, rebuilt after the invasion of the Moors (probably in the tenth century, FERGUSON, *History*, 8vo., Lond., 1865, i, 448, who gives the façade from a drawing by Waring in *Transactions of Royal Institute of British Architects*, 4 March 1861): the richly decorated altar designed by Questel is given in colours in DALY, *Revue Générale*, 4to., Paris, 1857, xv, 20, pl. 3-4; plan, elevation, and details are in POLLET: it is said to have been consecrated in 1107. The centre of the cross is supported by four granite columns supposed to have belonged to the altar erected at the confluence of the two rivers in the time of Augustus, who resided three years at Lyon. Under the sacristy and below the bed of the river are dreary dungeons without light. The church of S. Martin des Fontaines, near the city was designed 1834-6 by J. Pollet (pl. 26); and also that of La Madeleine at Tarare, seven leagues distant, in 1826 (pl. 36 and 40). The synagogue by A. Hirsch is given in DALY, *Revue Générale*, 4to., Paris, 1865, xxiii, pl. 43-8. Near the cathedral is a building called the hôtel de Chevière, supposed to be of the same date as the above church at Ainay.

The following are the chief buildings of the city. The archiepiscopal palace. The palais de Justice, with a colonnade of twenty-four columns, cir. 1830 by V. Baltard. The hôtel de ville, 1447-55, with a campanile 158 ft. high, which with the front was designed by S. Maupin 1646-55; the first floor was damaged by fire 1674; it was restored by J. H. Mansard, who altered the exterior; DESJARDINS, *Monographie*, fol., Paris, 1863-6. The palais des arts et du commerce, (view of the court in CHAPUY, pl. 15) including the exchange designed 1749 by J. G. Soufflot, were in 1806-26 joined with the musée by J. J. P. Gay and — Dardel in the buildings of the former monastery of S. Pierre, dating from an early period; the façade next the place des Terreaux was designed by De la Valsinière, it is given in GOURLIER, etc., *Choix d'édifices*, fol., Paris, 1837-44, iii, 321-4; and in DARDEL, *Monographie du palais de Commerce*, fol., Paris, 1863-4; these consist of a picture gallery,

a medal room, a statue gallery with another for ancient paintings; a room for mechanical inventions; a free drawing school; etc. The collège founded 1519, with a public library in part of the building having about 80,000 printed volumes with a rich collection of MSS. and drawings. The Institution la Martinière affording gratuitous instruction to 220 sons of artisans. A good veterinary school. The large hôtel dieu, founded 546, erected before 1784 by J. G. Soufflot, but destroyed 1793; the entrance gateway was by De la Monce, and the *portail* of the church by Mimerel; it is in the form of a cross, with a façade of recent date. The maison de la Charité, an extensive poorhouse. The mont de piété, occupying the manécanterie or deanery of the cathedral, designed before 1784 by de Crenice. The hospice de l'Antiquaille on the site of the Roman prætorium, now used for 600 patients partly as a lunatic, and a Magdalen, asylum, and general penitentiary. The new prison, BALTARD, *Prison en remplacement de celle de S. Joseph*, 8vo., Lyon, 1825: the maison des Recluses, used as a military prison: and that of Roanne regarded as a model of its sort. The theatre, 1754, by J. G. Soufflot, a very large one, as it was 64 ft. deep and 66 ft. between the boxes; it was considered so successful for hearing and seeing and being seen, that it became the type of all future theatres in France; having fallen into decay it was reconstructed 1829-31 by Chenavard and Pollet; a plan is given in FEROUSSON, *History*, iii, 465. The smaller theatre; a plan is given in POLLET, pl. 34. The front of the salle du concert was by R. de Cotte. The winter garden, 1847, by H. Horcau, covers about two and a half acres of ground, and cost about £12,000; the central hall is 72 ft. square; a plan and section are given in the *CIVIL ENGINEER Journal*, 1851, xiv, 265. The halle au blé, designed cir. 1810 by J. J. P. Gay. The grenier de l'abondance, by R. de Cotte, 416 ft. 7 ins. long and 52 ft. 6 ins. wide; plan in *ALLG. BAUZEITUNG*, 1852, pl. 491. The abattoirs, combined formerly, if not so still, with the meat market in a very disagreeable manner, the cattle being slaughtered in the market-place. The masonic lodge, cir. 1810, in the Brotteaux, by C. Cochet. A Renaissance well with a hood in an angle of a wall is given in LECLERE, pl. 33.

PINET, *Pourtrait de L. en 1564 par Gonet*, 8vo., Lyon, 1844. SPON, *Recherches des Antiquités et Curiosités de la ville*, 12mo., Lyon, 1675. POLLET and ROUX, *Monuments d'Architecture—à Lyon*, fol., Paris, 1841. FAYE, *L'Eglise de L.*, 12mo., Lyon, 1859, (reviewed in *BUILDER Journal*, 1861, xix, 770). CHAPUY, *France Monumentale*, fol., Paris, 1842, etc., pl. 5-8; 13-6. LE P. D. D. C. T***, *Antiquités de la ville de L.*, 12mo., Lyon, 1738. ROCAUE, *Plan of Lyon*, with elevations, fol., 1746. *Plan of Lyon*, fol., 1784. DESJARDINS, *Notes sur l'hôtel de ville*, 8vo., Lyon, 1861. MARTIN, *Recherches sur l'Architecture*, etc., dans les *Maisons du Moyen Age et de la Renaissance à Lyon*, fol., Paris, 1857-63. ARTAUD, various works on the Mosaics and Antiquities, 1806-35. LABORDE, *Monuments de France*, fol., Paris, 1816. WOODS, *Letters*, 4to., London, 1828, i, 128-36. ROUYER and DARCEL, *Art Architectural*, 4to., Paris, 1863-6, giving examples of ornament, etc., in i, pl. 71-2, 86-8, 51.

14. 15. 25. 28. 50. 63.

Among the materials used at Lyon, are the red stone of Tournus, which is used by sculptors and carvers and takes a good polish; the stones furnished by the quarries at Lucenay,

S. Cyr, and Couson, which are analogous to the veined and (more or less dark) grey marble full of (often whitish) shells obtained from S. Fortunat for steps and jambs: the stone of Pomiers, which RONDELET thought had been employed in building the old Lyonese churches; it is now used for chimney pieces: and a very uniformly sized rubble from the banks of the Ain; BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, 16.

LYON (HENRIET DE), master mason of the works at S. Jehan at Lyon cir. 1508-42, also appears to have been engaged at Bourges cathedral; COMITÉ HISTORIQUE DES ARTS, *Bulletin*, 8vo., Paris, 1843, ii, 467-70.

LYON (Archbishop HUMBERT de), see HUMBERT.

LYON (PATRICK), third earl of Kinghorn succeeded to the title 1647, and by charter 30 May 1672 was made first earl of Strathmore; he died 15 May 1695 aged 52 years. "His first essay was upon his tower in the carse of Gowrie, then known as Castle Lyon, now called Castle Huntley"; he then designed Castle Glamis from about 1670; in his own account of his enterprise still existing in MS. at Glamis, he mentions making a scheme or draught of his projected improvements, and takes blame to himself for not consulting 'any who in this age were known and reputed to be the best judges and contrivers.' INNES, *Scotland in the Middle Ages*, 8vo., Edinburgh, 1860, p. 317; ROBERTSON, in *Transactions of Arch. Inst. of Scotland*, 4to., Edinburgh, 1851, i, 61; BILLINGS, *Baronial Antiquities*, 4to., London, 1845-52, ii.

LYRE. A variety of the stringed musical instrument called 'harp': its peculiarity consists in the parallel disposition of its strings, within a bow, like ordinates drawn from the chord to the curve; the centre of the bow generally rests on a foot; and the horns of the bow are susceptible of any artistic treatment. Although neglected by musicians in the present day, the lyre continues to be a favourite symbol, in decoration, of poetry and of music: it has been observed that a lyre over a doorway intimates the entrance to a lyric theatre; and that a lyre between griffins is received as a conventional accompaniment for a concert-room or a music-hall. The lyre was sometimes played with a plectrum, and sometimes with the fingers. Abundant illustrations of the use of this instrument occur in antique bas-reliefs and on painted vases. EGAN, *On the Antiquity and Primitive Form of the Harp*, in the *Journal of the Archaeological Institute*, 8vo., London, 1851, vi, 103-16. A singular representation of the instrument, from an Irish manuscript, is given in *ARCHÆOLOGICAL JOURNAL*, 8vo., London, 1850, vii, 24.

LYRIODENDRUM, see LIRIODENDRON.

LYSIS. The Latin form of the Gr. λυσις, which appears in a disputed text "frangunt sua lysi structuras" in VITRUVIUS, vi, 11, where, if the words be correct, the translation must be that beams, sagging, break the structure by the mere curvature which they assume. But the same author clearly uses the word for a cymatium, iii, 3, to a stylobate, and v, 7, to a podium; hence it is explained in *Dictionaries*, as a plinth or step above the cornice of the podium which surrounds the stylobate; whereof an example may be seen in the temple of Fortuna Virilis at Rome.

1. 2.

LYTHODIPYRA, see TERRA COTTA.

LYTTUS in Crete, see LYCTUS.



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MACA

M ROOF. A term used in the early part of the eighteenth century for a roof of high pitch, which is reduced above the collar beam by small roofs, forming the letter **M**, having a gutter in the middle, whereby one-third of the height may be taken off; HOPKINS, *Gentleman's Repository*, 4to., Lond., 1737, p. 84, pl. 75. It is also applied to a roof formed by the junction of two roofs with common rafters only, having a gutter between them; as is often the case with the curb, or mansard, roof.

MABA GUIANENSIS. A tree of Guiana supplying Satinwood formerly much used for furniture. **CHLOROXYLON.**

MABBLED, see **HERRINGBONE WORK.**

MACADAM PAVING. The name given to an upper coating of a roadway consisting of hard stone, such as mountain limestone, whinstone, pennant, and the various granites and syenites, but Guernsey granite is found to last the longest. It should be broken into square pieces by hammers so as to pass through a $2\frac{1}{2}$ inch mesh; it is frequently reduced by stone crushing machines, but is so much injured by that process, that hand broken stone, though costing about a shilling a ton more, is in the end more economical; especially if small gravel be spread upon the newly coated road, and after saturation with water, it be levelled by a roller from 10 to 15 tons in weight.

The system was introduced by John Loudon MacAdam while inspector of roads, etc., from about 1798, as recorded in *Report of the Select Committee on Mr. McAdam's petition*, fol., Lond., 1823; also in his *Remarks on the present system of road making*, etc., 8vo., Lond., 1822, and 1824; and *Management of Trusts for care of Roads*, 8vo., Lond., 1825. J. P. SMITH, *On Macadamised roads for the streets of Towns*, read 31 Jan. 1854 at the Institution of Civil Engineers, *Minutes of Proceedings*, 8vo., London, 1854, p. 231, notices that "the greatest amount of wear and tear of macadamised street surface in Birmingham was shown to be four inches per annum; the average might be therefore taken at two inches; the cost of maintenance was fourpence per superficial yard, and that of watering and cleansing was twopence, per annum. Paving cost fifteen shillings per yard, it required to be renewed once in fifteen years, and the cleansing cost about one halfpenny per yard: paving was, therefore, evidently about double as expensive as the other system at Birmingham"; other advantages are detailed, which are also reported in the *ATHENÆUM Journal*, 1854, p. 153; and *CIVIL ENGINEER*, etc., *Journal*, xii, 306. ARNTZ, *Attempt to determine the circumstances under which, with a view to economy, paved and macadamised roadways should respectively be formed*, 8vo., London, 1857, decides that where the traffic is large it is more economical to pave: *BUILDING NEWS Journal*, 1858, iv, p. 45; *BUILDER Journal*, 1865, xxiii, p. 222: vii, 461; and the reply thereto, viii, 115-6. It

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has been noticed that notwithstanding the great wear and scraping of these roads, they accumulate in height about 6 ins. in every twenty years.

MACARIO (MAESTRO LANDO DI), commonly called Maestro Lando, of Siena, worked about 1311 as a goldsmith, as recorded in the passage "magister Landus de Senis aurifaber Henrici VII regis Italie", in a document so dated in the archives of the Cistercians at Milan, given in *MURATORI*, ii, 310, de comm. de corona ferrea, cap. xiii: *CICOGNARA, Storia*, fol., Venice, 1818, i, 399. He practised as an architect at Naples, and was engaged as a sculptor at Orvieto where until the arrival of Meo, he acted as architect to the duomo during the occasional absences of L. Maitani. He was recalled 1337 by the government to his native town, for the purpose of enlarging the cathedral church on the piazza Manetti, for which the foundations were laid 1338; but in consequence of some calamity which 1356 befel the city, it was discontinued: the transepts were alone finished; the south front and the gigantic nave and aisles are visible; the drawings made by Lando still exist in the archives of the duomo.

MACCARUCCI (BERNARDINO), son of a carver in wood, studied under G. Massari, from whose design he executed the façade of the scuola della Carità, at Venice. Amongst his own works in that city were the Ridotto near the piazza di S. Marco; the suppressed church of S. Lionardo; the restoration of the sala de' Banchetti in the palazzo ducale; and the front of the church of S. Rocco. He died in 1798. *SELVATICO, Venezia*, 8vo., Venice, 1847, p. 465.

MACCI (GIOVANNI ANTONIO), see **MAGGI (G. A.)**

MACERATA. A town situated in the Papal States of Italy; and the see of a bishop. It is walled; and has six gates, the porta Pio or Romana, representing a triumphal arch, was designed by Jacometti: the streets in general are straight, spacious, and clean, and lined with good houses and palaces. The public square in the middle of the town, irregular in shape, is of great extent, and contains the provincial palace, the theatre 1767 by A. Galli Bibiena, and the cathedral dedicated to S. Paolo, it was restored 1464-70 by G. Peruzzi; and the bell tower erected 1478. There are six other churches, many of them retaining their Gothic porches which serve to mark the passage from the old style to the neo-classic; the capella di S. Maria della Misericordia 1735 by L. Vanvitelli; eight monasteries; five convents; a college which has taken the place of the former university; a museum; and a library founded 1773 with 30,000 volumes. Immediately outside the gate to Fermo is a stately edifice designed 1823-6 by Ireneo Aleandri of Sanseverino, for the national game of *pallone*, and said to be the largest known; it is given by him in *Sferisterio*, fol., Firenze, 1828. About one mile beyond the town is

the church of the Madonna della Vergine, regarded as one of Bramante's best designs. RICCI, *Memorie Storiche delle Arti*, Macerata, 1834. 28. 50. 96.

MACDOUGALL DISINFECTANT POWDER. A compound carbolate and sulphite of lime and magnesia. It consists of sulphite of magnesia (or better still of magnesian limestone, lime in addition being an improvement) with 5 per cent. of carbolic or phenic acid (a sort of creasote of coal tar). *BUILDER Journal*, 1857, xv, 253, 268. DEODORIZER.

MACEDA (ASENSIO DE), see MAEDA (A. DE).

MACERIA. An enclosed place unroofed. **COLUMBARIUM.**

It is also a late Latin word for a wall built of stones without mortar; AQUINUS, *Vocab. Arch.*, 4to., Rome, 1734.

MAC GILL (ALEXANDER), with James Smith, appears in ADAM, *Vitruvius Scoticus*, fol., Edinburgh (1720-40), on pl. 28, of the north front of Yester-house, East Lothian, for the marquess of Tweeddale; on pl. 83 bis, 84, alone, of plans of Blair Drummond, in Stirling, for James Drummond, Esq.; and on pl. 94, to Dunibirsle-house, in Fyfe, for the earl of Murray, but probably he designed only the courtyard and offices of that mansion.

MACHICOLATION (from *masçil*, *maschil*, or *mèches* and *coulisse*; Fr. *machicoulis*; late Lat. *machicolatum* and *machicolatum*). The projection, formed by a parapet as b, on the



top of a wall as a, or of a tower, supported by brackets or corbels as c, between which was left an open space as b; through this hole melted lead, stones, and other missiles, were dropped on the heads of the assailants below when they came close up to the walls. It was a military means of offence and defence adopted throughout the Middle Ages in Asia and Europe, whether by the Saracens or by the Christians, and was probably invented by the latter. In France the earliest introduction of stone machicolation is seen in an appendage to the cathedral at Puy en Velay dating in the twelfth century, and soon after seen in the château de Coucy. A series of square holes in the vaultings of

gateways were used for the same purpose.

"At Warwick castle, Warwickshire, one of the corner towers, called Cesar's tower (fourteenth century) is very perfect and very fine: the machicoulis round it, near the top, are very perfect and very good, still carrying the covered passage or alure for the use of the soldiers in case of attack, which is so commonly wanting in English castles that the real use of machicolations is seldom understood; they are in general a series of corbels for the purpose of carrying a gallery of this kind, which was often of wood"; TURNER and PARKER, *Domestic Architecture*, 8vo., London, 1853, ii, 245. A good view of this tower is given in BRITTON, *Arch. Antig.*, 4to., Lond., 1807-14, iv.

A good article with illustrations of *couronnement*, *créneaux*, *moucharabys*, *machicoulis*, *hourds*, etc., is given in DALY, *Recue Général*, 4to., Paris, 1843, iv, 385-96. Others are given s. v. in VIOLETT LE DUC, *Dict.*, 1863, from which work the woodcut illustrating a covered alure is taken. Examples at Pavia, Segovia, and other places, are given in GAILHABAUD, *Arch. du Vme. siècle*, 4to., Paris, 1858, iii. *Illustrations*, s. v. Fortress, 1861, pt. 2: 1863-5, pt. 1. 1. 2. 10. 14. 25.

MACHINERY. The six mechanical powers, viz., the lever, the pulley, the wheel and the axle, the inclined plane, the wedge, and the screw, are the basis of all machinery. A notice of the various machines used to save labour in building opera-

tions would extend to great length. Several of them are described under the respective heads, of CARVER'S TOOLS; DERRICK; EXCAVATING; GYN; HOIST; HOUSE MOVING; LIFT; LEWIS; MACHINE; MORTISE AND TENON; STONE DRESSING.

BORDE, *Machines pour construction de bâtiments*, etc., fol.: RAMELLI, *Diverse machines*, fol., Parigi, 1588: HACHETTE, *Traité élémentaire des Machines*, 4to., Paris, 1811: BORGNI, *Des Machines que l'on emploie dans les constructions*, 4to., Paris, 1818: ECK, *Recueil des Machines*, fol., Paris, 1836, and Liège, 1840: ROYAL ENGINEERS, *Papers on Engineering*, in vol. v, 4to., London, 1846; BUCHANAN, *Tools and Machines*, 8vo., London, 1842: RANKINE, *Machinery and Mill-work*, 8vo., London, 1869: *The LATHE and its Uses, or Art of Turning in Wood and Metal*, 1869: TEMPLETON, *Engineer's, Millwright's, and Machinist's Practical Assistant*, 2nd edit., 18mo., Lond., 1862; KENNIE, *Modern Tools and Machinery*, fol., London, 1842; MOLESWORTH, *Conversion of Wood by Machinery*, read at the Institution of Civil Engineers, 17 Nov. 1857; ARMENGAUD, *Publications Industrielles des Machines*, etc., 10 vols., fol., Paris and London, 1846-52: BLACKIE, *Examples of Machinery and Mill-work*, fol.: NEWLAND, *Carpenter's and Joiner's Assistant*, 4to., Liverpool, 1860. 1. 6.

MACHUCA (PEDRO), designed 1527 the palace at the Alhambra, which is the earliest example in Spain of the style there known as *Greco-Romano*. It appears that this maestro-mayor of the royal works at Granada charged 21,000 maravedis for eleven days of journey and ten days of labour 1545 while inspecting, with six other architects, the six designs for the 'hospital de la Sangre' at Seville, and selecting one by M. de Gainza whose annual salary as its architect was only 20,000 maravedis. 66.

MACHUCA (LUIS), succeeded his father Pedro in the works of the palace of the Alhambra, with an annual salary of 50 ducats; reported 1557 with other architects on the works to the *capilla real* in the cathedral at Seville: and died 1579. J. de Orea succeeded him. 66.

MACHUCA Y VARGAS (MANUEL), born 1750 at Madrid, a pupil of V. Rodriguez. He obtained 1769 the first prize in the academy of S. Fernando; and was elected 3 May 1772 a member, and he became 22 Jan. 1787 sub-director. Later he was employed to report upon the changes desired by the canons and consuls, in the façade proposed by M. de Olivares as maestro-mayor to the cathedral at Cadiz; being afterwards directed to visit the works at intervals as chief architect to see that his suggestions were duly executed by Olivares. He became architect to the palace of Buen-Retiro, putting the casa de capellanes, the parapet round the great basin, a grotesque fountain, etc.; besides the casa-nueva in the plazuela de Zelenque, and another at the corner of the calle de las Maldonadas in the plazuela de la Cebada. Elsewhere his chief works were the parish churches at Berme in Biscay; at la Membrilla near Jadraque; at Ajalvis near Alcalá; at Miedes near Guadalajara; and at Rivadeo in Galicia; a country house for the duchess of Castejon; and one for the marquess of Aguilar at Aranjuez. He died 22 Sept. 1799 at Madrid. 66.

MACIGNO STONE. A term applied to the hard sandstone formations of the offsets of the Apennines. In some places it is much more schistose than in others. The *pietra serena* of Florence is a sandstone from quarries round FIESOLE; and east of it from the monte Ceceri quarries, which have furnished a sort of sandstone for the principal edifices of Florence. The *lavabo*, dating about 1490, in the South Kensington museum, is said to be of this stone; LAVATORY. The *pietra forte* of Florence is a coarse limestone also called *galestra*, abounding in all the hills south of the city, and used for its polygonal pavement and the walls of the palazzi. DENNIS, *Etruria*, 8vo., London, 1848, ii, 119; VASARI, *Vite*, Introd. Arch., i, 12mo., Florence, 1846, i, 111. 28.

MACK (ROBERT) of Dublin, "a skilful mason", built 1753-55 Essex bridge over the river Liffey, from the designs of G.

Simple. In 1771-4 he designed Powerscourt house in William-street in that city, for Richard viscount Powerscourt; it was afterwards the stamp office, and a silk warehouse; a view is given in MALTON, *Picturesque View*, fol., Dublin, 1795; and in POOL and CASH, *Views*, 4to., Dublin, 1780. 61.

MACKENZIE (THOMAS), of Elgin, was born in 1814. He studied under his two brothers (one the city architect at Perth), then under Mr. John Smith of Aberdeen, and 1839 under Mr. Archibald Simpson of the same city. On the death of Mr. Robertson he commenced practice in 1841 at Elgin, where he designed the museum (Italian); the Roman catholic chapel (Gothic); and the Free church; with his partner Mr. J. Mathews of Aberdeen, he also designed the commercial bank, the railway hotel, and 1851 the markets; with a house at Laurel bank for Dr. Geddes. At Aberdeen, they designed 1851 the nave, chancel, and south aisle of the Episcopal church of S. John the Evangelist (described in *BUILDER Journal*, ix, 360); and the new college for students of the Free church. They also 1844 obtained the first prize for the college of the Free Church Assembly at Edinburgh, but the design was not carried out. Mr. Mackenzie designed the buildings used for Milne's schools at Fochabers; the castellated building erected in Botriphnie for admiral Duff of Drummur; a similar building for Mr. Matheson on his property of Ardross; 1854 a castle in Perthshire for Mr. Robertson of Strowan; the Free church at Inverness (Perpendicular); the United Presbyterian church at Nairn; the Caledonian bank at Forres; the poor houses at Aberdeen; and at Banff, the new hall of S. Andrew's lodge; and a residence for Mr. W. Grant. Among his important additions to old structures, were the remodelling for the late Sir John Grant, Bart., of the old castle and lodge of Ballindalloch in Banffshire, carrying out the portions erected in the middle of the sixteenth century; some additions to the old castle of Cawdor; and for the earl of Fife, the restorations of the old priory of Pluscarden. Whilst at Aberdeen a series of views of the city were published from his pencil. He died 15 October 1854, aged 39 years, at Elgin, of disease of the brain. *BUILDER Journal* 1849, vii, 320, notices his design for the Culloiden monument; 1854, xii, 593; xiii, 394. *BUILDING CHRONICLE*, 1854, i, p. 98, gives a view of Ballindalloch castle.

MACKINNELL VENTILATOR. A patent taken out in 1855 by Mr. J. McKinnell, secretary of the Athenæum at Glasgow, is described as consisting essentially of two tubes, the one placed within the other, with an *annular space* between them, and both opening freely to the external air. The internal tube, destined to carry off the vitiated air, is placed in the chamber to be ventilated with its downward opening near the ceiling, towards which the air, from its superior lightness, naturally rises. The annular space is intended to supply the waste by permitting the external atmosphere to pass through it into the chamber. A flange, checking the entering air in its downward course, is introduced to cause it to spread equally over the whole area without producing sudden fluctuations of temperature. Acting upon the discoveries of Dr. Stenhouse, the inventor proposed to attach to the supply tubes a thin sieve of crudely broken charcoal, to act as a deodoriser and detergent, of the air passing into the room; *BUILDER Journal*, 1855, xiii, 414; xiv, 576; xviii, 4. It differs from the Watson, the Shaftesbury, and the Muir, ventilators, in that it is circular, the others being square or oblong: they are shown



in GWILT, *Encyclopædia*, edit. 1867, p. 1068.

MAC PACE (J.), see PEACOCK (JOSEPH).

MÂCON. The chief town in the department of the Saône et Loire, in France. It is irregularly built, having narrow ill-formed streets, with some good modern buildings. The ramparts have been converted into promenades. The bridge

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over the river Saône leading to S. Laurent on the opposite bank, has twelve or thirteen arches, and dates from 997. Only the towers and front remain of the old cathedral of S. Vincent, dating from 1187-80; these have been lately restored. A plan and elevation of the new church of S. Vincent, 1810-16, is given in LÉCLÈRE, *Recueil d'Architecture*, fol., Paris 1826, pl. 17. The new church of S. Pierre in the Romanesque style, 300 ft. long, is described in the *REVUE DE L'ART CHRÉTIEN* for 1865. The other chief edifices are the hospital built 1770 by J. Soufflot; the maison de la Charité founded 1680; the hospice de la Providence founded 1736; the hôtel Montrevel, now the hôtel de ville, containing a small theatre and public library; the bishop's palace now the préfecture; the infirmary; the royal college; and the new prison. Among the Roman antiquities are noticed a triumphal arch, and the ruins of a temple to Janus. CLUNY, once containing the celebrated Benedictine abbey destroyed 1789, is situated about fifteen miles south-west of Mâcon. MAILLARD DE CHAMBURE, *Voyage pitt. en Bourgogne*, fol. Dijon 1833, ii, 68, gives a view of the old cathedral, and an account of the buildings destroyed during the Revolution. 50.

MACRI or MAKRI, in Asiatic Turkey, the site of the ancient TELMESSUS of Asia Minor.

MACQUET (. . .) designed a Gothic chapel built 1825 in the Commune des Herbiers, (Vendée) i, pl. 157; 1825 the hôtel de préfecture at Puy (Haute Loire) at a cost of 272,500 francs, ii, pl. 82-3; 1826 the palais de justice at Privas (Ardèche), ii, pl. 86; 1830 the maison d'arrêt at Beaune (Côte d'Or), ii, pl. 153-4; and 1833-46 the séminaire at Langres (Haute Marne), behind the cathedral of S. Mammès, a plan of which is given iii, pl. 378-9, of GOURLIER and others, *Choix d'Edifices*, fol., Paris, 1825 50: its portal or façade is by D'Aviler. His death has not been found recorded.

MACULOSUM MARMOR. Spotted marbles, which were not in vogue in the time of the celebrated sculptors, were obtained in the islands of Thasos and Lesbos, the marble from the latter country being more livid (black and blue like a bruise,) than that obtained in Thasos. PLINY, *H. N.*, xxxvi, 5, thinks that spotted marbles were first employed when the walls of the city of Chios were built; and records a criticism by Cicero when these walls were shown to him as something magnificent: "I should have much more admired them if you had built them with stone from Tibur." The same author observes that Menander, who well described luxury as regards the whole ('apparatus') employment of marbles, was the first to mention (and that rarely) the 'versicolores maculæ,' or diversely coloured (not changing) spots. Furthermore he says that columns of this sort were used in building temples, not for the sake of magnificence, for as yet they were not so considered, but because stronger material could not be obtained: "therefore is unfinished at Athens the temple of Jupiter Olympius from which Sylla removed the columns to the Capitoline buildings" (at Rome); a sentence which seems to intimate that the columns which now remain are of later date than that event: WILKINS, *Atheniensis*, and LEAKE, *Topography*, (quoted in STUART and REVETT, *Athens*, sm. 4to., London, 1837, p. 71-2,) state that the columns of this temple are of Pentelic marble.

But the most remarkable portion of Pliny's notice upon this subject must be given in his own words: "non fuisse picturæ honos ullus non modo tantus in aliquâ marmorum auctoritate," which may best be rendered inversely, 'painting would not have been so honoured or rather would not have been honoured at all, if marbles had been in fashion.'

MADAIN (El). The site of the ancient CRESIPHON, in southern Assyria.

MADDER. A dye formed of the long slender roots of the rubia tinctorum, a plant which is extensively cultivated in Holland: SIMMONDS, *Commercial Products of the Vegetable Kingdom*, 8vo., London, 1854, p. 478. The following useful colours for water or oil, were obtained from it about 1823 by

Mr. G. Field. Madder or Field's carmine; rose lakes of madder; rubric or madder lakes; madder purple or purple rubiate or Field's purple, a very rich and deep carmine; madder brown or Field's russet of which there are three sorts, russet, orange russet, and dark russet or intense madder brown; the last dries best in oil; it is a valuable pigment in the graining of mabogany. FIELD, *Grammar of Colouring*, 12mo., London (Weale) 1848. Madder yellow or Capuchin yellow madder, a bright colour resembling Indian yellow, but more powerful and transparent though not so durable in hue, being acted on by time and metallic and other substances; WEALE, *Dictionary of Terms*, 8vo., London, 1849-50.

MADDOX (GEORGE), was born 1760 at Monmouth, where his father was a builder, to whom he was apprenticed; having served his term, he went to London and obtained an engagement with John Soane. He was next connected with the Pantheon in Oxford-street in such a manner as to be seriously involved in the pecuniary affairs of that property; and by the death (1790) of Henry Frederick, duke of Cumberland, the project of building an opera house in Leicester-square was abandoned just as all but the final preliminaries had been arranged; his design has not been preserved. About 1820 he was engaged by Messrs. Woolcott and Browning to conduct the works at Clarence house, then building by them under B. Wyatt for Frederick duke of York, in the stable-yard at St. James's Palace; and also in building Strensham-court, near Pershore, Worcestershire (except the portico and finishings which were done after he left them) for — Taylor, Esq., banker, of Birmingham. His pictures in oil, exhibited for many years at the Society of British Artists, were as interesting as those by Gandy, from their varied beauties of detail, and the fresh and valuable ideas with which they abounded. The private buildings designed by him formed original compositions, in an Anglo-Greek style, that were highly deserving of attention. His works best known recently were some shop-fronts: one for a chemist at No. — Strand, opposite the church of S. Mary-le-Strand; another near it for Messrs. Godfrey and Cooke in Southampton-street; another in Conduit-street, Bond-street; and another (1836) in Tavistock-place, Woburn-square; besides a long front, lately destroyed, for — Tucker, a glazier in High Holborn. He had a school of drawing, and among his many pupils were, Decimus Burton (who in 1869 presented an album of drawings by Maddox to the Royal Institute of British Architects), W. Macintosh Brooks, W. Hosking, John Davies, W. J. Booth, and Charles Parker. For many years before his death he had chiefly occupied himself in tuition and in designing and drawing for his professional brethren, but was frequently interrupted by severe illnesses. He had made considerable progress with a series of about forty etchings, when he died 7 October 1813 in his eighty-third year. CIVIL ENGINEER etc. *Journal*, 1844, vii, 118; which p. 6, gives his method of geometrically describing a volute. BUILDING NEWS, xii, 659.

MADERNO (CARLO), sometimes called Carlo Lombardo as by NAGLER, was born 1556 at Bissone on the Lago di Como. He first practised as a stuccoist at Rome, in which city he served under his uncle D. Fontana, replacing him on his death 1607, and worked under ten popes, all of whom regarded him with favour. His first work of note is said to have been the tomb of Sixtus V (died 1590) whose funeral he carried out after the designs of D. Fontana: they are engraved by G. Raimondi.

For cardinal Salviati, whose palace near the collegio Romano Maderno had finished, he carried on the church of S. Giacomo degli Incurabili commenced by F. da Volterra, finishing the choir, high altar, and the façade (Rossi, pl. 59); and constructed the choir and dome to the church, by Sansovino and A. (Picconi) San Gallo, of S. Giovanni de' Fiorentini, (LETAROUILLY, p. 541, says, choir decorations, and the façade and completion were by A. Galilei 1735). For the Aldobrandini family he erected in the church of Sta. Maria sopra Minerva,

the capella della Nunziata, the capella Aldobrandini, and the decorations above the cornice of the choir; LETAROUILLY, p. 399, says he built the great tribune and restored the choir: together with a palace facing the church of S. Luigi de' Francesi. For the cardinal Rusticucci he designed the palace in the Borgo Nuovo near the piazza di S. Pietro, now called the palazzo Accorombono; and the front of the church of Sta. Susanna on the Quirinal (given in Rossi, pl. 64). His design for the front of S. Peter's having been selected out of nine submitted in competition, he was appointed architect 5 Nov. 1607 by Paul V (1605-21) to S. Peter's after the deaths of G. della Porta and D. Fontana. The old basilica was begun to be pulled down 20 Feb. 1606-7; he commenced 1608 the nave and aisles, changing the plan into a Latin from a Greek cross; the design of the present front was approved 18 July 1612; the two front campaniles and the foundations were begun 1613, but abandoned 1614; the vestibule was roofed 12 Dec. 1614; and the confession in the crypt made 1607-17; his *porta palatio* 1608 was pulled down 1660 by G. L. Bernini for the porticoes; BONANNI, pp. 10; 101-2; 177, 213; pl. 27-30; pl. 46a, 47, 58-62, 79-81): a plan in QUATREMBÈRE DE QUINCY, *Vies*; Rossi, pl. 3, 5, and 9). For the same pope he enlarged the palace on Monte Cavallo, adding a number of apartments with the chapel and hall (perhaps shown in FERRERIO, pl. 50): and removed 1614, a white marble fluted column of the Corinthian order from the ruins of the ancient temple of Pax, to the piazza Sta. Maria Maggiore, placing it on a pedestal and completing it by a cap and a bronze statue of the Virgin by G. Bertolet (DESCODETZ, *Rome*, fol., Paris, 1682, p. 107; LETAROUILLY, p. 621). He repaired and decorated the palazzo Olgiati, opposite the chiesa delle Stimate; also the palazzo Ludovisi opposite the church of the SS. Apostoli; and completed the palazzo for cardinal Scipio Borghese on the via di Ripetta.

He was directed by several popes to examine different parts of their States, and to take a plan of the fortress at Ferrara, during which journey he made a number of designs for buildings. He was also sent to Perugia to divert the waters of the inundation caused by the river Chiana; and on his return to Rome he was rewarded with the order of the golden spur, and a gift of a rich chain. In that city he designed the church Sta. Maria della Vittoria, the façade being continued by G. Soria very similar to that of Sta. Susanna; the church and monastery of Sta. Lucia in Selce; and the church and monastery of Sta. Chiara, considered by some as the work of F. da Volterra; PASCOLI notices only the altar as by Maderno. He planned the choir, tribune, and eupola (and perhaps façade) of the church of S. Andrea della Valle which had been commenced 1591 by P. P. Olivieri (Rossi, pl. 43-5; LETAROUILLY, p. 411, 568, attributing to him two of the candelabra given in pl. 194.) For cardinal Mazarin he enlarged the present palazzo Rospigliosi upon the piazza del Quirinale, with S. Venturi. He designed the third chapel at the sides of the tribune in the old choir in the church of S. Paolo fuori le mura; remodernized the palazzo Strozzi; completed the palazzo Lan-cellotti in the rione di ponte alli Coronari, begun by F. da Volterra for Sixtus V; (FERRERIO, pl. 91, attributes it to Maderno and the door to D. Zampieri; LETAROUILLY, pl. 349; the cortile is given in ROSSINI, pl. 37;) designed the tribune in the church of Sta. Maria della Pace; projected the removal, not carried out, of the obelisk in the Campo Marzio to Monte Cavallo or to the fontana de' Trevi; designed the palazzo Mattei di Giove, which is considered his best work; (the façade towards Sta. Caterina de' Funari in the rione di S. Angelo is shown in FERRERIO, pl. 84; and in BLONDEL, *Cours*, 8vo., Paris, 1771, iii, 428, pl. 64; LETAROUILLY shows it as the fourth of the contiguous palaces and carried out for Asdrubal Mattei, p. 249, 362, pl. 107-8, 164-5; the cortile is given in ROSSINI, pl. 27;) commenced about 1624 the palazzo Barberini on the Quirinal, for the prince of Palestrina (Urban VIII); (LETAROUILLY, p. 388, attributes to him the hinder portion, the

right-hand staircase, and the *cordonata* or *scala a bastoni*, and the façade at the back of the building), this latter work was directed by his pupil D. Castello, who also continued there under G. L. Bernini, who in general succeeded Maderno: continued the palazzo Agostino Chigi in the piazza Colonna, commenced by G. della Porta and completed by F. della Greca (FERRERIO, pl. 56); designed the plan for the palazzo of cardinal Flavio Chigi, afterwards the palazzo Bracciano and now Odescalchi in the piazza de' SS. Apostoli, also attributed to G. L. Bernini who perhaps completed it (FERRERIO, pl. 57); designed the buildings at Castel Gandolfo for Urban VIII (1623-44) continued by B. Brecciali and D. Castello (FALDA, *Nuovo Teatro*, fol., Rome, 1669, iii, 7-10); and the cappella del Santissimo Sacramento in the church of S. Paolo.

Maderno composed many designs for the first cities of France, Spain, and Italy; at Perugia he designed 1632 the church of S. Domenico in place of that erected 1304 by G. da Pisa; BOARINI, *Storia*, 4to., Perugia, 1778, p. 25. Among his other works at Rome he put the Orders to the reception front (*brecciato*) of the hospital degli Orfanelli; and was employed at the church of S. Gregorio at Montecelio, adding the chapel of that saint. He designed various bridges; and the casino and villa for the marquis Sagrati. As to fountains, he designed the two in front of S. Peter's (*Illustrations*, s. v. Fountain, 1858-59); the one in the great cortile or Belvedere of the Vatican; one at the foot of the *cordonata* near thereto; one in the piazza di S. Giacomo Scossacavallo; another in the piazza of the basilica of Sta. Maria Maggiore; with those called, Lo Scoglio in the gardens of the Belvedere; della Torre; la Galera; and that of Nella Poggia in the gardens of the pontifical palace on the Quirinal; they are all illustrated in FALDA, *Fontane*, fol., Rome (1675?), i, pl. 1-3, 26; iii, 1-4. F. Brecciali was connected with Maderno in many of his works as pupil or assistant. Maderno died of the stone 30 January 1629-30, aged 73 years, and was buried in the church of S. Giovanni dei Fiorentini; his epitaph is given in PASCOLI, *Vite Moderne*, 4to., Rome, 1730-2, in which he is called 'Eques' and 'Novocomensis.' FERRERIO, *Palazzi*, fol., Rome, 1655; ROSSI, *Insignium Romæ Templorum*, fol., Rome, 1684; QUATREMÈRE DE QUINCY, *Vies*, 4to., Paris, 1830, ii, 111; ROSSINI, *Monumenti*, fol., Rome, n. d.; BONANNI, *Vaticanium*, fol., Rome, 1696-99.

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MADEO (JOHANNES ANTONINUS DE) is also called AMADEO; HOMODEO or HOMODEUS; properly OMODEO (G. A.)

MADER (MICHAEL) of Berlin, was after 1502 *baumeister* to the cathedral at Ulm. 92.

MADHOUSE, see LUNATIC ASYLUM.

MADONNA DELL' ORTO (BARTOLOMEO, called Bortolo tajapiera), executed 1459 under the doge Francesco Foscari, a portion of the palazzo ducale at Venice. SANSOVINO by error has added Buono to the name, as remarked by CIOGNARA, *Fabbriche*, fol., Venice, 1838, p. 85.

MADRAS. The capital of the presidency of the same name, situated on the east coast of Hindostan. A great part of the city consists of the 'Black Town,' closely and irregularly built with brick or mud houses, for the most part consisting of continuous apartments, arranged round a small quadrangular court. The garden houses in the vicinity, chiefly occupied by the Europeans, are one story high, plastered, but without any architectural pretensions. The city is built on a dead level, and with the many populous suburbs occupies an area of about thirty square miles; the water is excellent and abundant. The St. Andrew's Bridge over the river Koom dates 1818.

One of the chief objects is the citadel or fort S. George, first built 1639; it contains S. Mary's or the old church, the barracks, an arsenal, and an exchange. The cathedral dedicated to S. George is situate in the suburb Royapetta; there are also the Vepery Mission church; S. Peter's, and S. Andrew's churches, the latter completed 1820 costing £20,000; several churches and chapels of various denominations, besides a Roman

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Catholic cathedral. Other buildings of note are the government house; the mint; a high school and medical college supported by government; the large missionary institutions of the Free church with 700 pupils, and that of the Scottish establishment with 400 pupils; a general hospital; a lunatic asylum; and orphan asylums dating back to 1787. On the beach is a line of public offices, including the supreme court, the custom house, the marine board office, and the store houses, all well constructed buildings with colonnades to the upper stories over arched rustic basements, finished with chunam, and appearing like marble. An equestrian statue of Sir Thomas Munro is by Sir F. Chantrey. The jetty or suspension pier 1856 is by J. H. Taylor. Five views are given in DANNIEL, *Oriental Scenery*, fol., London, 1801, 3rd series. DAY, *Land of the Permauls or Cochín (Madras), its past and present*, 8vo., Madras, 1893. THORNTON, *Gazetteer*, 8vo., London, 1858. WHEELER, *Madras in the Olden Time*, 8vo., Madras, 1861-2; and his other works. BUILDER *Journal*, xxvii, 449. 50. 71.

MADRE DE DIOS (ALBERTO DE LA), a barefooted carmelite, was engaged 1611 in the construction of the Augustinian nunnery of Sta. Isabel, designed just before his death by F. de Mora, at Madrid; and with J. de Nantes submitted to the order of Santiago a design for covering R. Gil de Hontañón's great staircase in its colegio del Rey at Salamanca. His dispute 1626 with J. M. Teotocopuli, on the mode of enclosing and covering the mozarabic chapel in the cathedral at Toledo, was conducted to the disadvantage of the friar. 66.

MADREPORE MARBLE. A marble consisting largely of corals or madrepores, the surface resembling delicate stars. It is the *pietra stellaria* of the Italians. The marbles of LANGUEDOC, of Flanders, of Sainte Anne, and others, are classed under *les marbres bariolés* of BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, 273. The houses at Jidda (the port of Mecca) are built of large blocks of very fine madrepore, which are carved and covered with fretwork ornamentation, as noticed by lord VALENTIA, *Voyages*, 4to., London, 1809, iii, 309. Japan exhibited at Paris 1867, a wonderful marble made up of madrepores encased in marvellously coloured jasper of great hardness. BARIOLE; DEVONSHIRE MARBLE.

MADRID (the Roman Majoritum and Mantua Carpentanorum), the capital of Spain. It is situated on a lofty plateau of hills that hang over the river, or rivulet as it is often nearly dry, Manzanares; the puente de Toledo, 1735, is 335 ft. long and 36 ft. wide; that de Segovia, designed 1584 by Juan de Herrera, is 695 ft. by 31 ft.; and that de la Piora 1595-6 is by F. de Mora. The city is first historically mentioned c. 930, under Ramiro II; it really rose under the emperor Charles V (1516-55), and was built chiefly (1598-1735) by Philip III, Philip IV, and Charles II, and perfected under the foreigner; 1695-1735 was the period of Churriguera and his school, of whom P. de Ribera was the most actively employed in Madrid; the rococo of Louis XV is carried to excess: Charles III (1756-88) worked in brick—hence the spiritless, meaningless piles, the ostentatious frontage of edifices, behind which were mean, ill-paved, ill-lighted, and ill-drained lanes. The best houses are lofty, occupied in flats, with a common staircase; since 1833 the city has been much improved. Among the public buildings, besides those hereafter named, are 19 hospitals; an university; 9 academies; 4 public libraries; and 5 chief gates, of which the best, the puerta de Alcalá, erected 1778 by F. Sabatini, who also designed the puerta de S. Vicente; the puerta del Sol with the great promenade called the Prado, which was laid out by F. Sanchez under J. Hermosilla who died 1776, is given in the ILLUSTRATED LONDON NEWS *Journal*, 1846, ix, 248. The gate near the bridge of Toledo was built 1813-27 by A. Aguador. Among the thirty-three public fountains, those at the puerta del Sol, Red de S. Luis, plazuela de Anton Martin, and calle de S. Juan, were by P. de Ribera. That in the calle de Hortaleza (los Galápagos) and 1775 those on the Prado were by V. Rodriguez whose great sewer running out beyond the

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puerta de Atocha has an inscription (given in LLAGUNO, iv, 245) which is the only one that preserves the memory of that reformer of architecture in Madrid; AQUENECT, p. 17. The plaza mayor or grand square 434 ft. long and 334 ft. wide was formed 1619 by Juan de Mora; but many houses have been burnt, as in 1790. The bronze equestrian statue of Philip III commenced by G. da Bologna from a drawing by Pantoja and completed by P. Tacca was removed from the casa del Campo. The recent bronze statue of Cervantes opposite the Cortes was modelled by Antonio Sola of Barcelona, and cast by Hofgarten of Prussia. Amongst the largest houses of the nobility is that of the duque de Medinaceli; like part of that belonging to the marques de Astorga, which is unhappily placed in a lane, it was designed by V. Rodriguez; that of the conde de Oñate; and that of the duque de Híjar: the fine residence of the Alva family, built by Rodriguez, since injured by successive fires, contains some good pictures. No. 2 Calle de las Infantas, occupied by king Charles I of England, and by the Venetian envoy in the time of Philip IV, was built by Herrera and is one of the oldest mansions. Las Vistillas, long the town residence of the dukes de Infantado, and where Ferdinand and Isabella lived, is now occupied by the duque de Osuna.

The church of Sta. Maria de la Almudena, once a mosque, retains, like the tower at Tortosa, the name of the moslem *muéddin*. It was dedicated to the Virgin by Alonso VI (1072-1109), and is the mother church; it was repaired 1777 by V. Rodriguez; an oval chapel was executed about 1650 by P. and G. de la Peña: a chapel of the Bosmedianos exhibits the plateresque school of art. The church of San Gines, built about 1358, injured by fire 1824; had its cupola and capilla del Santo Christo executed about 1769 by F. Sanchez. The church of S. Francisco el grande is a vast pile, the monastery of which now serves as a barrack, and the chapel as a parish church. It was designed by F. de la Cabezas, and begun 8 Nov. 1761, stopped 1768, but completed 1770 by Pló and altered 1784 by F. Sabatini. The church is a rotunda 117 ft. in diameter and 153 (or 163) ft. in height, surrounded by six small chapels each 35 ft. square having its cupola; the capilla mayor is 75 ft. long by 47 ft. wide, and has a corresponding porch of three arches between two towers. The church of S. Andres, used by Ferdinand and Isabella as their parish church, has a chapel (by D. de Madrid, 1657), which held the remains of S. Isidro until removed to the colegio imperial; adjoining is the capilla del Obispo 1547, one of the few Gothic specimens (both are engraved in VILLE AMIL, i); the retablo was carved by F. Giralte 1548, who executed the superb tombs of the founder Gutierrez de Vargas y Carvajal, bishop of Plasencia, and his family; it was repaired 1755 after an earthquake. The church La Latina or Nuestra Señora de la Concepcion, in the calle de Toledo, a franciscan nunnery with a hospital, was designed 1505 by the Moor el maestro HAZAN, who also executed the hieronymite nunnery of N. S. de la Concepcion. The church of San Isidro el real, once the Jesuits' colegio imperial, was built 1626-51; this building with that of the Salvador del mundo belonging to their noviciate, was designed by the Jesuit F. Bautista; the former was used as a parish church called la Colegiata: its *presbiterio* was re-arranged 1769 by V. Rodriguez: the oval vestibule and circular chapel over the body of the saint were decorated by S. de Herrera Barnuevo before 1670. Of the few other churches worth visiting San Ildefonso was rebuilt 1827; and San Marcos, forming a group of three ellipses, was begun 1749 by Ventura Rodriguez who was buried in it. J. de Herrera was buried in the church of San Nicolas.

The monastery of San Geronimo was the national mausoleum, and one of the few Gothic specimens in Madrid, having been erected 1502 with materials from the hieronymite building (1460) on the bank of the river: its fine tombs, with those in San Martin, were destroyed by the French. Las Salesas Viejas, an enormous nunnery, was built 1750-8, by F. Carlier, with a

residence for Barbara queen of Ferdinand VI; the imposing Corinthian chapel is now a parish church; the tombs of the king and queen were designed by F. Sabatini and carved by Gutierrez; the marbles of the high altar are very fine, the green pillars were brought from the quarries of San Juan near Granada. The convent of Descalzas reales was founded by Juana daughter of Charles V (1516-55); the effigy on her tomb is by P. Leoni; the interior of the church was redecorated before 1774 by D. de Villanueva. The monastery of Santo Domingo el real founded 1217 has a portico finished 1539 attributed to Luis de Vega, the *coro* was added 1599 by J. de Herrera. The convent of Atocha, founded 1523 for dominicans, was rebuilt for Ferdinand VII (1808-33) by Isidro Velasquez; the chapel contains the celebrated image of the Virgin, the patroness of Madrid. Many religious establishments were doomed to destruction during the Revolution of 1868-69.

The palace faces two open plazas, that to the east was begun by Joseph as a sort of *place du Carrousel*; a theatre and a colonnade were built in it for Ferdinand VII (1808-33). The gardens on the west with royal statues, &c., were finished by A. G. Arguelles; in the centre of a circular plot is the fine bronze equestrian statue of Philip IV removed from the Buen-retiro gardens; it was probably designed by Velasquez the painter; Montañes carved the model in wood and it was cast 1640 in Florence by P. Tacca; it weighs 180 cwt. and is 19 ft. high. The old palace or alcazar 1537-61 having been burnt on Christmas Eve 1734, a new one was designed for Philip V by Juvara as a rival to that of Versailles; the model is preserved. Philip then employed G. B. Sacchetti of Turin, who made a design on a smaller plan adopted 7 April 1737 but augmented under F. Sabatini; it is a square of 470 ft. by 100 ft. in height, but the wings and hanging gardens are incomplete. The inner court is about 240 ft. square. The sala de Embajadores is given in VILLE AMIL, iii. The royal chapel is to the north; the foundations only of a larger chapel are laid. The coachhouses and stabling are very extensive. There are also a museum of mineralogy and antiquities; and a national library in a house once belonging to the Alcañices family, the fittings of walnut wood were put up by Godoy, prince of Peace, it contains about 200,000 volumes, with 150,000 coins and medals. The royal armoury on the south side, consisting of a gallery 227 ft. long by 36 ft. wide built 1556-64 by G. de la Vega, was the caballeriza of Philip II. The casa de los Ministerios erected by F. Sabatini for Charles IV (1788-1808), has a grand staircase and vestibule much damaged by fire 31 October 1846. To the extreme west of Madrid is the casa del Campo or shooting box of Charles III (1756-88), connected with the palace by a bridge and a tunnel; the buildings were restored by queen Christina who formed here a model farm. To the extreme east of Madrid is the *Buen retiro*, a large extent of ruined buildings and pretty gardens laid out with the palace by J. Gomez de Mora under J. B. Crescencio, but commenced 1633 by A. Carbonel, for the duque de Olivares (who had an aviary here) as a pleasant retreat for Philip IV; the theatre was designed 1628 by C. Lotti of Florence, but was apparently rebuilt, of an unusual depth, about 1725 by P. de Ribera, or in 1770 as given in DUMONT, *Parallèle de Plans*, etc., fol., Paris, n.d.: six small views exist of the residence and its gardens, engraved by L. Meunier about 1650. This palace having been burnt by accident, was rebuilt by Ferdinand VI (1746-56): the banqueting or ball room painted by Giordano, now contains the military museum. The casino in Las Delicias was given by the municipality to Isabel, second wife of Ferdinand VII; it is a sort of Trianon.

The palacio del congreso de diputados, at present of the Cortes, was designed 1842-50 by Pascual y Colmenero or Colomer; the façade is 180 ft. long; the hall of assembly is 100 ft. diameter by 130 ft. in depth (ILLUSTRATED LONDON NEWS *Journal*, xvii, 376; and *BUILDING NEWS Journal*, 1860, vi, 697, 708). The casa del Ayuntamiento, or casas consistoriales,

is of the sixteenth century with later portals; the peristyle was added by J. de Villanueva. The casa de los Consejos and oficinas reales built 1611 by F. de Mora for the palace of the duque de Uceda has the interior still unfinished. The museum designed for Charles III (1756-88) by J. de Villanueva, and continued under Charles IV (1788-1808) was ruined, but repaired 1819-21 by Ferdinand VII for a picture gallery; it also contains a good collection of cups, tazzas, etc., and a gallery of sculpture. The museum of the Trinidad with a gallery of paintings opened 1842 is in the suppressed monastery of the SS. Trinidad, which was designed by Juan de Valencia but chiefly executed 1590-1611 by G. Ordoñez; the staircase 1618-20 is by A. Marcos, the cloister (one of the two finest in Madrid) in two stories of the Tuscan Order dates 1639-70, the transept and capella mayor 1650-80. The offices of the finance minister, (ministerio de la hacienda y direcciones del Ramo), are in the custom house erected 1769 by F. Sabatini. The custom house and tobacco warehouse by J. Churriguera, was converted, with a new portal replacing his tremendous gateway, by D. or J. de Villanueva, for the royal academy of San Fernando 1744, which has a gallery opened in 1819 of about 300 paintings, a museum of fine marbles, etc. The square palace, La buena vista, erected at the end of the eighteenth century by the duchess of Alva, was bought and given to Godoy; being confiscated in 1808 it was formed into the war office, the military museum has been removed to the *buena vista*. The observatory was erected for Charles III (1756-88) by J. de Villanueva, who also formed the campo santo outside the puerta de Fuencarral; and the entrance to the botanic garden, which is fenced in by an iron railing removed here 1781. The imprenta real is a heavy building by Turillo, but the interior was done about 1774 by J. P. Arnal. The competition for the Hispano-American exhibition, and for the hotel of the minister of public works, are noticed in *BUILDER Journal*, 1862, xx, 707-8. The casa de correos or post office is a large isolated edifice 1768 by Jayme Marquet; and close to it the casa de postas 1802 by J. P. Arnal.

The huge hospital (el general), founded 1582 was built 1748, but enlarged 1784 by F. Sabatini; the hospital de San Fernando (el hospicio), founded 1688 has a façade 1726 by P. de Ribera; that of San Antonio founded 1606 has a good oval chapel and ceiling painted in fresco; the foundling hospital (la Inclusa) provides for upwards of 1200 children. The poor house or mendicinity asylum was founded 1834. The old carcel de Corte built 1634-43 by J. B. Crescencio, has all (except the brick front with stone dressings, which was considered one of the best pieces of architecture in Madrid) been lately demolished for rebuilding: the Audiencias or courts of justice are here. The city prison called la casa del Saladero near the gate of Sta. Barbara, was commenced 1762 by V. Rodriguez. The seminario de Nobles is a huge building 1725 by P. de Ribera. The colegio de San Carlos 1783 is the college of surgeons.

The plaza de toros erected 1749 by A. Jolli is about 1100 ft. in circumference, and holds about 12,000 persons. Of the theatres, one in the calle de Cruz built 1737 for 1300 persons, by P. de Ribera, is badly contrived; the Principe for 1200 persons was built 1806 by J. de Villanueva; the opera or teatro reale de Oriente is said 1850 to be the most magnificent in Spain, and its acoustic qualities highly satisfactory; the others are the Circo or Spanish opera; las Variedades; the Buena Vista; and the Lope de Vega.

In the environs are situated, el Pardo, a royal *sitio* or shooting box, begun about 1540 by L. de Vega for Charles V; part of the offices was designed by Herrera; it was burnt 13 March 1604; but repaired by F. de Mora for Philip III, doubled on the east side by F. Sabatini for Charles III; the corpo de guardia is by P. de Ribera; and a small theatre was erected about 1759 by Jayme Marquet: the Alameda, a villa made by the late duchess countess of Benavente at an enormous expence:

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and about 28 miles distant the royal residence of ARANJUEZ, to which there was a railway formed in 1846-51.

Besides the architects named in the above description, the following directed works in this city; Antoine, Aranda, Donoso, Galan, Fernandez, Guill, Gonzales Velasquez, Goyti, Hernandez, Lizargarate, Machuca, Martin Rodriguez, de la Madre de Dios, de San Nicolas, de la O, G. Soria, de Toledo, Testocopuli, and de Vega.

Map, No. 188, published 1833 by the Society for the Diffusion of Useful Knowledge; Louis MEUNIER, engraved about 1650 ten small views of the palaces and fountains; ROBERTS, *Picturesque Sketches in Spain*, fol., London, 1837, gives the bridge; WELLS, *Picturesque Antiquities of Spain*, 8vo., Lond., 1846, p. 92; LAKE PRICE and FORD, *Tauromania*, fol., Lond., 1852; CAVEDA, *Ensayo historico*, 8vo., Madrid, 1848; TAYLOR, *Voyage pittoresque en Espagne*, fol., Paris, 1826-42; TORIJA, *Tratado breve sobre las Ordenanzas de la Villa de M.*, 4to., Madrid, 1661; SWINBURNE, *Picturesque Tour through Spain*, fol., London, 1806, p. 306, 350; PONZ, *Viage de España*, 8vo., Madrid, 1776; VILLEAMIL and ESCOSURA, *L'Espagne Artistique*, 3 vols., fol., Paris, 1842-59. 28. 50. 66. 85.

MADRID (DIEGO DE), a Capuchin monk, designed the monastery of his Order at Jaen; and the chapel of S. Isidro commenced 22 April 1657 by J. de Villareal, at the church of S. Andres at Madrid. 66.

MADRIER. A French term for a plank of timber from 3 to 6 ins. thick and 10 to 18 ins. wide, placed to form a foundation at the bottom of a trench to support a wall: and to a plank covered with tin and earth for a defence against fire. The term is used in VIOLETTÉ-LE-DUC, *Dict.*, for the planks filling in the spandrels of the curves in mediæval roofs, and for the wood struts or cantilevers beneath. 2. 5.

MADURA. A town in the presidency of Madras in Hindostan, situated on the right bank of the river Vagah. It is surrounded by a lofty stone wall having square bastions, in many places much dilapidated; wide streets and market places have been made lately; the private dwellings are mean. The public edifices are among the extraordinary specimens of Hindoo architecture. The great temple, chiefly devoted to Mahadeva, with its spacious areas, choultries, and four colossal porticoes, each a pyramid of ten stories, covers a very large extent of ground. The vast palace, now falling into decay, has a dome 90 feet in diameter; and in front a choultry or covered building for travellers, called that of Trimul Naik, built 1623-45, and costing nearly a million sterling; it is "about 333 ft. long by 81 ft. 10 in. wide, supported by 128 pillars or piers, all of which differ, yet being covered with the most elaborate and minute architectural ornaments", as noticed by FERGUSON, *Handbook of Arch.*, 8vo., London, 1855, i, 97, who gives the plan and one of the pillars; 89, the Perumal pagoda; and 105, the hall in the palace, from DANIELL, *Views*, fol., London, 1805, ser. 2, who gives several plates of these two buildings. BREWER, *Palaces*, 2nd edit., 4to., London, 1821, notices it and gives a view. A collection of 140 drawings in pen and ink, executed about 1800, showing one hundred and twenty-three of these pillars, was catalogued by Quaritch, April, 1863, at £25. Near the town is a remarkable eminence called from its shape the Elephant rock. HINDOO; INDIAN. 50.

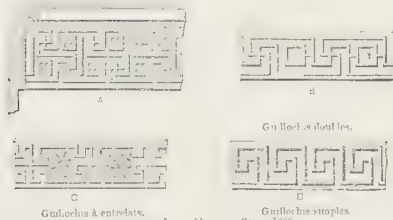
MÆANDER. An ornament which derives its appellation from the Gr. name of a very winding river in Asia Minor. *Μαλάρδος* is defined by HESYCHIUS as *κόσμος τις ὀροφικός*, a roof decoration, and is generally understood to have meant any of those patterns which English workmen have long, but improperly, called FRET, leaving the name mæander to an ornament, founded upon either of the lines called in heraldry, wavy, or nebuly, or even dancetty.

It is remarkable that QUATREMÈRE DE QUINCY, *Dict.*, s. v., insists that the symbols on coins are ornamental guillochis, and translates *μαλάρδος* by *guillochi*: in fact his reference under the latter word to an imitation (not a copy) of the soffit of

the architrave of the temple to Mars Ultor, in the ceiling of the entrance to the palazzo Pietro Massimi by Peruzzi at Rome, (LETAROUILLY, *Rome Moderne*, p. 600 and pl. 298,) shows that he applied the words, *guillochi*, *méandre*, and *bîtons rompus*, to the English fret. He is however careful to observe that as others confuse the *guillochis* or *méandre* with the Vitruvian scroll (the Fr. *postes*, and the It. *poste*), and as *guillochis* or *méandres* are known in Italy as 'alla Greca', so the word *grecque* is likely to remain in France the technical name of the *méandre*, when *bîtons rompus* is not the term preferred.

The simplest form is given by cutting in a mitre-box pieces of equal length from a lath, and so placing them together as to give the outline of a square notched battlement: this occurs executed on two different scales on the single capital of the temple at Bassæ, as well as in early mediæval work, of which examples are indicated by the COMITÉ HISTORIQUE, *Instructions*, 4to., Paris, 1840, p. 50. This embattled fret obtains richness by having a gouge passed along the centre of the lath before it is cut.

In modern work a battlemented mæander is overlaid with another, of more or less importance and of different pattern. In the antique labyrinthine mæander or fret, the upright side of the notch stops, turns, passes upwards, turns, and passes downwards, to join the line marking the bottom of the notch. This, in work either gouged or repeated, seems to give the "guillochis ou méandres à doubles lignes et en retour", for which QUATREMÈRE, s. v. cites the Etruscan vases. A rich ornament is formed when either the notch or the crenel is filled with a geometrical or a conventional figure; and one still richer by the repetition of the mæander on each side of an invisible centre line, so that a mæander comes opposite to a figure; and sometimes the mæander crosses the centre; QUATREMÈRE refers s. v. Balbeck, to a beautifully designed and executed example of his "double grecque" on the platband in the surbase about four feet above the floor of the smaller temple in that place. That pattern is similar to the rich (double) mæander



(here shown fig. A), painted (not carved) above the sculptured frieze in the temple to (Theseus) Mars at Athens. The extremity of satisfactory richness seems thereby to have been reached, yet both notch and crenel thus treated are sometimes accompanied with an overlaying fret, and the design then becomes confused.

It must be observed as singular that, although it is found in Mexican, Chinese, Celtic, Egyptian, and Arabian architecture (OWEN JONES, *Grammar of Ornament*, fol., London, 1857,) as well as in the Etruscan and Greek, yet something resembling the labyrinthine fret is only found in Assyrian decoration as an ornament on a dress; a cloak "meandro duplici" is mentioned by VIRGIL, *Æneid*, v, 251, as noticed by REVELEY, in STUART and REVETT, *Ant. of Athens*, fol., London, 1827, iii, 72-3, who observes that as at the Parthenon, and the temple to Nemesis at Rhamnus, similarly situated fascias were painted with the same ornament, it must have been considered as an appropriate mode of finishing those parts of Doric temples at the epoch. He terminates his note by a long list of references, to which may be added INWOOD, *Erechtheum*, fol., London, 1827, pp. 126, 139, 140: and WILKINS, *Atheniensis*, 4to., London, 1816, p. 87.

MAEDA (JUAN DE), was aparejador to D. de Siloe; in

whose will, 1563, he is named as executor and heir to all the drawings and to part of the armour of his patron; at which time he became *maestro-mayor* to the cathedral at Granada until 1574; and, 24 November 1574 in place of P. Diaz de Palacios, to that of Seville, where he finished 1574-75 the capilla-real. Dying 1583 he was succeeded by his son. 65. 66.

MAEDA, also written MACEDA and MEYDA (ASENSIO DE), a son of JUAN, was old enough 1563 to be a pupil of D. de Siloe and heir to all his tools and instruments. He became 1582 *maestro-mayor* of the cathedral at Seville where he finished, under the advice of J. de Minjares, the *sala capitular*; was appointed 19 January 1583 *maestro-mayor* of the "hospital de la Sangre" in that city with an annual salary of 15,000 maravedis; received 100 golden ducats for his journey reporting with two others, on the design submitted 1593 by H. Ruiz III. of Cordova for heightening the tower of the cathedral in that city: and is supposed to have lived to complete 1618 his portal, of the hospital already mentioned, with the assistance 1587-97 of M. Perez as *maestro-mayor*, while M. de Zumarraga acted as his *aparejador* 1587-1618 at the cathedral. If either this architect or his father was *maestro mayor* at the cathedral at Cordova, that post was probably held by Asensio at some period between 1583 and 1593. 66.

MAENHIR (from *hir*, long or upright, and *men*, stone), also called *pulcan* from *pul*, pillar, and *van*, stone. One of the series of Celtic memorials comprising the pillar stones; such as the *Monolith* or Druid's pillar, which is a single erect raised stone: *Ortholith*, or giant's tooth, devil's arrow, etc., erect stones in a line, the stones in contact or apart: *Paralleolith*, the same in parallel lines; if these be curved or serpentine it is often called *Dracontium*: *Cyclolith*, or Druid's temple, the same in a circle, sometimes concentric; ceremonial: LUKIS, in the *ARCHÆOLOGICAL JOURNAL*, 24, Feb. 1853; and *ARCHÆOLOGIA*, xxxv, 233, reported in the *LITERARY GAZETTE Journal*, 5 March. TAYLOR and NODIER, *Bretagne*, fol., Paris, 1845-6, ii, 364, give one in a field near Dol. In Sardinia these standing stones are called *perdas longas* or *perdas fittas*, upright stones, and are not so usual as the *NURHAG*. A list of publications is given s. v. Cromlechs and Druidical works.

MAENIANUM, also spelt MENIANUM and MOENIANUM. A term acknowledged by the best lexicographers to have no affinity with *moenia* as the walls of a city (although so stated in DIRKSEN), but to be an original Latin word. They believe S. POMPEIUS FESTUS, ASCONIUS PEDIANUS, and FORPHYRIUS, all of whom deliver as history, that "maeniana are so called from Maenius who was the first that extended" (or projected) "beams beyond columns, that there might be more room upon the upper floor"; and some of them explain that when M. Porcius Cato purchased of him B.C. 184, for the site of the Porcian basilica; a piece of ground originally the Curia Romuli, afterwards the Curia Hostilia and then his house in the Forum at Rome, the vendor reserved one column on which he built a cantilevered loggia whence he might witness the games: the last half of this explanation was received without suspicion of its really referring to another Maenius, consul B.C. 338, who for his victory in the battle of the Astura was honoured on the Capitoline hill near the end of the Forum with a column (the *columna maenia* of late authors) carrying an equestrian statue, according to SMITH, *Dict.*, *Biog.* s. n.; and as STATIUS represents the equestrian statue of Domitian as viewing the forum, so the statue of Maenius might have been noticed as viewing the games therein. But the whole confusion is cleared by SMITH, *Dict. Ant.*, s. v., who cites FESTUS (ed. Moller p. 135) and ISIDORUS, *Orig.*, xi, 3, for the signification "a balcony which was erected round the Roman forum—by the censor C. Maenius B.C. 318. Cantilevered balconies are shown in 79-80 of SERLIO, *Architettura*, fol., Venice, 1663, where the It. names *pergolo*, *poggiuolo*, and *ringhiera*, correspond to *concio*, *maenianum*, *podium*, and *suggestus* in the Latin text; these four words indicate the pro-

priety of referring for an explanation of the inscription, "FRATIBUS ARVALIBUS MOENIANO" to TORRE, *Monumenta Veteris Antii*, pl. 17, p. 94, and the remarks thereon in MAFFEI, *Dogli Anfiteatri*, 8vo., Ver., 1728, ii, 285. The word *moeniana* occurs in VITRUVIUS, v, 1, where PERRAULT supposed it to mean a terrace walk, or alure, but this is not the full meaning of the term as it appears in the following translation of the Augustan author, who, speaking of the porticos around the Italian forums, says that in them will be rightly situated the shops of the bankers; and on the upper floor the *moeniana*, which are constructed as apartments for the use of those persons and as offices for the collectors of the tolls payable in the market; this is almost precise enough to intimate such arrangements as the chambers and their galleries in the yards of the English old inns. Certainly PERRAULT might have said that his terraced walk or alure would be a sunny spot, and might have cited S. HIERONYMUS, *Ep. ad Suniam et Protellam*, who says, "sed domata quæ Romæ vel solaria vel meniana vocant, id est plana tecta quæ transversis trabibus sustentantur," where, as the Gr. *δομα* corresponded to the Lat. *tectum*, a terraced roof, rather than a balcony, would seem to be indicated. On the other hand the commentators on SPARTIAN, *Hist. Aug.*, 8vo., Leyden, 1671, i, 676, observe, "Meniana illa vel solaria quæ in planis tectis struebantur, Græcis, ἡλιαστήρια, ἡλιοκλῖμνοι, dicuntur; ἐξωστὰ etiam dicebantur: Latinis protecta et projecta tecta," where open loggias or verandas would be the best translation: HELIASTERIUM; LOGGIA; SOLARIUM.

The word is used by S. NOVELLANUS, under date 1574, in the "Town Book" of Cologne, where he says that "this year the town house has been adorned most splendidly with a gallery or moenian * * * resting upon sixteen pillars * * * it has beautiful arches under and above, and in the middle height a convenient promenade: WHIRWELL, *Arch. Notes*, 8vo., Lond., 1842, p. 207. This term appears to have been preserved by the Italians in the word *Mignano*, noted by QUATREMÈRE DE QUINCY, *Dict. s. v. balcon*, where he says, "En Italie, l'on ne s'est pas contenté des *balcons* ordinaires; on en pratique à certains étages qui sont vitrés, et qui forment une espèce d'avant corps d'où, sans être vu, l'on peut voir à couvert; quoique ces *balcons*, qu'on appelle *mignani*, gâtent souvent l'ordonnance de l'architecture et les façades des palais, cependant on peut ne les considérer que comme des hors-d'œuvre postiches, et, par leur nature, indépendants de la construction. La forme des fenêtres y reste dans de belles proportions, et les *balcons* n'en ont point encore altéré la forme, surtout dans les grands édifices": but this is a passage that is not lucid without an example or an illustration, any more than his note s. v. *meniane*, "On appelle ainsi, en Italie, les petites terrasses, les *balcons* ou logis, soit ouvertes, soit fermées avec des *jalousies*, pour voir au dehors sans être vu." And he ought to have exactly cited PLINY, *H. N.*, xxxv, 10, "macniana, inquit Varro, omnia operiebat Serapionis tabula sub veteribus; hic scenas optime pinxit sed hominem pingere non potuit."

MAEREMIUM and MAERENNUM, see MERIMNIUM. 19.

MAESS (HEINRICH). This name appears 1534 on the capital-haus, and on the transepts which he completed in 1550, of the Victors-kirche at Xanten. 92.

MAESTRO MAYOR. A Spanish term, in which the adjective *mayor* corresponds to the English word 'chief,' and the substantive meant at first a 'leader' but afterwards a 'director.' The following references are to the volumes of LLAGUNA, who (perhaps unauthorisedly) uses the term *arquitecto* for *maestro* throughout his work; translating *magister*, cc. 800, and *maestro*, by *arquitecto*, i, 5, as also *magister et conditor*, cc. 895, i, 10; and also *maestro mazonero* 1348, i, 65. Early inscriptions and documents give the title *maestro*, sometimes adding *de esta obra*, or *de las obras*; examples 1182, 1256, and 1277 occur i, 27, 26, 38; difference of rank among the masters of a work 1310 is noticed, i, 56. Two cases of 'magister fabricæ,' 'magister operis sive fabricæ,' and 'magister operis,' exist in a

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record dated 1416-7, while 'magister operum seu fabricarum,' 'magister in opere fabricæ,' and 'magister major operis,' only occur once in it, i, 263-72. In 1450 the word 'protomagister' is found, i, 280; in 1479 perhaps 'obrero mayor,' i, 123; and in 1485 'edificator principalis,' i, 127: the person who is received 1513 as *maestro principal*, and also styled *maestro de la obra*, is mentioned 1523 as *maestro mayor de las dichas obras*, but 1531 as *maestro de la obra*, i, 152-3: the latter term is also used as equivalent 1537; i, 168: yet at least two intimations are given of the post being enjoyed, 1418-25 and 1654-60, but the title withheld; i, 94; iv, 49. As early as 1424 the contractor sought to be the *maestro*; i, 257.

The *maestro mayor* of a cathedral was the architect in charge of the works; even so early as 1416 residence in the city was not always exacted; i, 264, 266. Sometimes the architect appointed an assistant, who 1416 is called 'socius magistris in opere fabricæ,' i, 265. Sometimes the substitute was a son (thus, 'regens pro dicto patre suo' occurs 1416, i, 264), who apparently 1522 held a power of attorney from the father, i, 163; and the official title of this substitute (*sobrestante* in 1561, ii, 225) or assistant, whether appointed by the architect or (as usually was the case) by the client, was APAREJADOR, an epithet which does not seem to have been traced earlier than 1425; i, 253: it was common 1512; i, 150: the *maestro* of a cathedral 1431 being *aparejador* of a chapel elsewhere, i, 103, is a curious case. Although used 1545, i, 212, the term *arquitecto* hardly occurs officially before 1561, ii, 225; and in 1564 it was requisite that the royal *arquitecto* should be appointed *maestro mayor* of the works with which he had to interfere, ii, 86, 87: this accounts for the title *maestro mayor de fabricas de la diocesis*, iv, 62, 63; iv, 119. In later times he is found holding the title of *arquitecto* to one grandee, while *maestro mayor* to other nobles, iv, 239: but the practice of the *maestro* on several works in the same period seems to have been allowed 1416 or earlier; i, 264, 266, 267. The employment simultaneously of two *maestros* on different parts of a structure 1500 and 1538 is mentioned, i, 130, 166: and the existence of two *maestro mayores* in one post is shown clearly 1667, iv, 73, 79; and 1690 probably, iv, 83, 103. But the more extraordinary facts of two *maestros* at the same time for one work, certainly 1439, and perhaps 1476 and 1507, given i, 105, 121, 143; as well as of three *maestro mayors* at once on one work 1472, 1496, and 1575, as mentioned, i, 84, 122, 85, 135, iii, 27, deserve especial notice. MASTER. 66.

MÆVIUM. The ancient name of MAGDEBURG in Prussia.

MAFFEI (GIOVANNI and NICOLÒ FRANCESCO), father and son, of Carrara, were also sculptors, and probably designed the church Monte Vergine at Messina; and completed 1605 the spedale della Pietà commenced 1542 by A. Sferrandino, G. Carrara, and others; the principal entrance is by G. Maffei. SAMPERI, *Messana Illustrata*, 4to., Messina, 1742, i, 622.

MAFIL, see MAFFIL.

MAFRA. A town situated seventeen miles north-west of Lisbon, in the province of Estramadura in Portugal. It is deserving of notice herein for its immense pile of buildings the *real convento e palacio* erected by king John V (1706-50), in rivalry of the Escorial of Spain. A design made for it by F. JUVARA was not accepted. It was designed by F. Ludovici, and the first stone laid 17 November 1717; his son Joao Pedro succeeded him in 1752. It is in the form of a quadrangle 760 ft. from east to west and 670 ft. (770 ft. MURRAY) from north to south, and includes a church consecrated 1730, having a cupola double like that of S. Peter's at Rome, and decorated with white, red, and black marbles; a royal palace; a college with a library (noticed s. v.) of about 30,000 or 50,000 volumes; and a monastery with three hundred cells, to which the Augustinian monks were transferred 1773 from S. Vicente de Afora at Lisbon. The buildings, which are mostly of marble and have a flat roof, are said to have cost about 19 millions of crowns; also 20 millions of crusados, or 40 millions of francs: BUILDER *Journal*, 1859, xvii, 28. BECKFORD, *Italy, Spain*,

and Portugal, 8vo., London, 1835 and 1839; British Museum, Addit. MS., No. 15,199, fol., 361-7, containing an account of the buildings 1731; JOAO DE PRADO, *Monumento Sacro da Fabrica,—de Mafra*, fol., Lisbon, 1751; MURPHY, *Portugal*, 4to., Lond., 1795; FERGUSSON, *History*, 1862, p. 159, with a view; FINDEN, *Illustrations of Byron*, 4to., London, 1833, i, quoting DALRYMPLE, *Travels*, 4to., London, 1777, p. 135; and KINSEY, *Portugal*, p. 452. 14. 28. 112.

MAGALHAENS (GERMANIO ANTONIO XAVIERO DE), a pupil of J. da Silva, became professor at the school of architecture at Lisbon, and designed the cathedral or collegiate church of Guimaraens; its completion was stopped by the French invasion, and it was still unfinished in 1835. The large church on a cruciform plan at Torres is also by him; and he designed many private palaces for the nobility; LONDON, *Architectural Magazine*, 8vo., London, 1835, ii, 141.

MAGATO (STEFANO). This name appears under the date 1 May 1392 among those of the architects employed on the works on Milan cathedral. GIOVANNI, in the same list 6 June 1406, was also a military engineer. FRANCHETTI, *Storia*, 4to., Milan, 1821, p. 140.

MAGAZINE. A term derived from the Arabic through the Span. *almacen*, *almagazen*, and *magacen*, and the Fr. *magasin*, for a public or private warehouse; GRANARY; and STORHOUSE; in England it is retained perhaps chiefly for the place in which gunpowder is stored. 14. 66.

MAGDEBURG, the ancient Mævium. The capital of the province of Saxony in Prussia, situated on the river Elbe, which divides the town into three parts of late formation, communicating with each other by several bridges, that of Frederick William 1080 ft. in length was built about 1835. It ranks as a fortress of the first class; the citadel was erected 1680. The houses are for the most part large and handsome, having been erected since 1631; but in the neighbourhood of the citadel they are crowded together; and most of the streets are narrow. Besides the public gardens, the chief squares are, the new market or *domplatz*, and the old market, which has an equestrian statue in sandstone of the emperor Otho with his two queens, erected after his death 973. The *dom* dedicated to S.

was burnt 1207; a model of the old cathedral is preserved in a side chapel: the choir and transepts rebuilt probably by 1234 are traditionally attributed to BONENSACK; the walls of the nave and aisles date about 1274; the building was vaulted about 1327, and consecrated 1363. The western towers, 350 ft. high, were completed 1520, those flanking the choir remain incomplete. The building, restored 1850 by the Prussian government, is 364 ft. long and 110 ft. high; the nave, remarkable for its loftiness, has twelve pillars. The cloisters are on the south side; and the south side of them dates in the twelfth century, the remainder in that of the thirteenth. The chapter house has granite pillars and capitals anterior to the fire of 1207. The font is formed of one block of porphyry; the pulpit 1594 is by Caput of Nordh or by Sebastian Extel: many of the tombs are worth attention. CLEMENS, MELLIN and ROSENTHAL, *Der Dom zu M.*, fol. Magd. 1852, in 30 pl.; KING, *Study Book*, 4to., London, 1858-68, iii, gives twelve plates; and some metal work in his *Orfèverie*, ii, pl., 19, 49, and 50; KALLENBACH, *Chronologie*, fol., Munich, 1847, gives two plates of the plan and details of the choir, 1210-20, and details of the nave, etc., 1260-80; with a carved beam of a house dated 1500. Besides the church of S. Sebastian; and the Marien-kirche Roman catholic older than the cathedral; there are about ten other churches, all erected since 1631: the tower of the Johannes-kirche 1453 (burnt 1631) was by Hans Irlxleben. The other chief buildings comprise, a town hall 1691; a ducal palace; a government house; a theatre; numerous courts and public offices; five large hospitals; three orphan asylums; numerous schools; and the artillery barracks. A railway connects the town with Berlin. SEMMIER, *Der Elbstrom Illustriert*.

14. 38. 50. 96.

MAGENTA. A fancy name given to a splendid crimson generated from aniline (obtained by distillation from coal-tar) by the action of oxidising agents. BUILDER *Journal*, 1862, xx, 545.

MAGENTA (GIOVANNI AMBROGIO), born about 1565 at Milan, became a Barnabite monk, and general of his order in 1612. He served the grand dukes of Florence and several popes. At Bologna, he commenced to rebuild 1605 the cathedral of S. Pietro, preserving the cappella maggiore, (the façade was executed by A. Torreggianni); he designed 1605-23 the church of S. Salvatore; and 1611 that of S. Paolo for the monks of his order, it was restored 1819 by Venturoli. He died in 1635. 32. 94. 105.

MAGGI (PAOLO) built 1614 the church of the ospizio della Trinità de' Pellegrini at Rome, its front being a later work by F. de Sanctis: a plan is given in LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 154; pl. 9: GWILT, *Notitia*, ascribes this church to Giovanni Antonio Macci, together with the church of S. Dionigi at Rome; and a Giovanni MAGGI, published *Fontane diverse, che si vedano in Roma, ed in altre parti d'Italia*, fol. Rome, 1618. 12. 111.

MAGHINARDO, was the architect of the *duomo vecchio* at Arezzo 1015, but the design is copied from S. Vitale at Ravenna; RONDINELLI, *Relazione*, 8vo., Arezzo, 1755, p. 18.

MAGISTER, see MASTER.

MAGISTERIUM. This late Latin term is applied to work which the tenant was bound to perform for his superior. It also expresses two other things which are explained, with illustrative texts that for want of space cannot be reprinted here, in DUPRESNE DUCANGE, fol., 1845, s. v., as being "magistri opus, It. *magisterio*," and "artificium, Fr. *maitrise*." These may be considered to mean respectively a specimen of a man's mastery of his business, and that mastery itself. The first seems to be clearly shown by the words "qui a fundamentis ipsorum portaliū creavit magisterium", inscribed with the date 1188 on the principal entrance to the cathedral at Santiago, as given in LLAGUNA, *Noticias*, 4to., Madrid, 1829, i, 33. The other is as clearly intimated in the story of Pleberus, whose father murdered Conrad, bishop of Utrecht, 1099, for having induced the youth to let him know the manner in which the elder man contemplated making the foundation for the cathedral; this is told in DE BEKA and HEDA, *Chronicon*, fol., Utrecht, 1643, p. 43; where "arcanum magisterium" led RAMÉE, *Hist.*, 12mo., Paris, 1843, ii, 160, 281, to say "cela prouve qu'il y avait de certaines règles tenues secrètes et appliquées à la construction des monuments sacrés", with "c'est le premier exemple d'un artiste laïque, d'un franc-maçon"; these errors vitiate several pages of the French historian's labours. The story only shows that in the eleventh century an architect knew of the passage in PLINY, *H. N.*, xxxvi, 21 (quoted s. v. EPHEsus), containing "calcatis ea substravere carbonibus dein velleribus lanæ," but meant to keep his information from competitors.

MAGISTRELLI (. . .) designed 1812 the theatre at Imola, which replaced the one by Morelli, burnt 1796.

MAGLIONE (. . .) of Arezzo, is said to have designed 1286 or 1294 the monastery and church of S. Domenico in that city; it is sometimes attributed 1250 to his master Nicolo da Pisa (WEBB), who is said to have entrusted to him the commencement of the execution of his design 1266 for the church of S. Lorenzo at Naples 1266-1324, where Maglione erected for cardinal Minutoli (whose arms are still to be seen over the old entrance in the Sedile Capuano) the palazzo arcivescovile, in the Largo Donnaregina, which was almost rebuilt 1647. FELIHEN, *Vies*, 12mo., Treves, 1725, v, 240.

MAGLIONE (FERRANTE) worked with G. BENINCASA at Naples, and died about 1580. 3. 36.

MAGNA GRÆCIA. The name given to a portion of the southern part of Italy, but including, in the opinion of STRABO, the Grecian towns in Sicily.

The part restrictedly so-called is the coast from Capo Bras-

sano or Capo di Bruzzano *promontorium Zephyrium* to Capo di Leuca *promontorium Iapygium*; no remains of Greek art, of any importance, seem to exist there except a few architectural fragments at Locrian (B.C. 750) *Locri Epizephyrii*, one column of the temple to Juno Lacinia on the *promontorium Lacinium*, fifteen columns at the Sybarite *Metapontum*, a theatre at the Spartan (B.C. 700) *Taras* or *Tarentum*, and walls at *Manduria* like those of large rectangular blocks without cement laid in regular courses at Syracuse.

But as there were a great number of cities, that were originally Greek, in Apulia and Bruttium, it is not unusual to consider that Magna Græcia extended much further, *i.e.*, to a line which is almost that of the fifteenth degree of longitude east of Greenwich: and it will be useful to notice, commencing at the south, some of the places; *e.g.*, Eubœan, Æolian, Dorian, and (B.C. 723) Messenian *Rhegium Iulii*; Achæan *Caulon*; Cretan *Castrum Mineræ*; (B.C. 710) Achæan *Crotone*; its colony *Terina*; Locrian *Hipponium*; (B.C. 720) Achæan and Troezenian *Sybaris*; (B.C. 446) Athenian *Thuri*; Tarentine *Heraclea*, which was the place of general assembly of the states of Magna Græcia; Cretan *Brundisium*; Iapygian *Barium*; Cretan *Uria* or *Hyria*; and three cities ascribed to Diomedes, *viz.*: *Sipontum*, *Arpi* or *Argyripa*, and *Luceria*; at the southern extremity of the line are (540 B.C.) Phœcean *Elia*, *Helia*, or *Velia*, with remains of polygonal walls that carry later work of bricks marked with Greek characters; and Sybarite *Phistulis*, *Posidonia*, or *Pæstum*, the only one of them all which demands a visit from the lover of Greek architecture. The nearest point of the approach of Greek (not Etruscan) art towards Rome may be said to be Cumæ, whence, according to STRABO, the Opisci or Osci were expelled by Eubœan and Lydian colonists; Acarnanian *Capri*, Eubœan and Lacedæmonian *Ænaris* or *Pithecosa*, *Cumæ*, Cuman *Parthenope* and Attic *Neapolis*, Corinthian (B.C. 600) *Nola*, and *Maleventum* afterwards *Beneventum* attributed with *Venafrum* to Diomedes, are all west of the line; but the silence of VITRUVIUS as to any important example of architecture there or in any other part of Magna Græcia, would lead many to suppose that none was extant in his time. Yet, when the languages of the Oscans, Etruscans, and Samnites had ceased to be vernacular, the Latin did not entirely supersede the Greek tongue upon the coasts. As to the Sicilian towns, those which were most important were *Egesta* or *Segeste*, Megærean *Selinus*, Rhodian or Cretan *Agrigentum* and its mother *Gela*, Corinthian *Syracuse*, Chalcidian *Catana*, and *Zancle* or *Messana*. Notice should be taken of the immigrants of the eleventh century at Aquino and Pontecorvo, of the fifteenth century in the Capitanata and in the Calabrias, of the sixteenth century in Naples, of the sixteenth and seventeenth centuries in the Basilicata, and of the eighteenth century at Villa Badessa, some of whom have not adopted, so completely as the Sicilians, the Italian language.

The publications by DE LA GARDETTE, 1799; HOUËL, 1782-7; SAINT NON, 1781-6; OSTERVALL, 1822-6; CUCCINIELLO and BIANCHI, *n. d.*; HITTORFF and ZANTH, 1825; and WILKINS, 1807; and FASO PIETRA SANTA, duca di Serradifalco, 1834-42; duc DE LUYNES, 1833; all relate to this ancient district.

MAGNANI (GIAMBATTISTA), is said to have designed the great theatre at Parma, opened 1618; it was, however, designed by G. ALEOTTI.

MAGNANO (MARGARITONE DI), see AREZZO (M. DI).

MAGNESIA AD STYLUM. An ancient town now represented by Manissa or Manser, situated about thirty miles north-east of Smyrna in Asiatic Turkey. It was nearly destroyed by an earthquake in the reign of Tiberius (14-37). The modern town, built on the left bank of the river Kodus or Hermus, is clean with tolerably wide streets, numerous minarets, and good public buildings (in this respect excelling Smyrna), particularly the chief khan, built of white stone, with the usual fountain in the middle of its courtyard. Besides eighteen mosques two others are imperial, one having been erected by Morad of

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Amurath II (1421-51), after his abdication of the throne 1443, the other by one of his wives or by his mother; and two palaces, which, with the tombs of the family, are in ruins. A marble fountain in front of each mosque is composed of antique fragments. There are also two Armenian churches, a large Greek church, and two synagogues. The almost perpendicular face of mount Sipylus at the back of the town has many caves, evidently tombs of a very early date, whose entrances are cut in the shape of doors. TOURNEFORT, *Voyage du Levant*, 8vo., London, 1741, iii, 330, gives a view; CHISHULL, *Travels in Turkey*, fol., London, 1747, remarks on the red glass; CHANDLER, *Asia Minor*, 4to., Oxford, 1775, p. 267; ARUNDELL, *Seven Churches*, 8vo., London, 1828, p. 193; MACFARLANE, *Constantinople*, 4to., London, 1829, pp. 176-97; KEPPEL, *Travels*, 8vo., London, 1831, ii, 295; CHESNEY, *Euphrates' Expedition*, 1835-37, 4to., London, 1850; FELLOWS, *Asia Minor*, 2 edit., 8vo., London, 1852. 23.

MAGNESIA AD MÆANDRUM. An ancient city of Ionia, in Asia Minor, situated about fifteen miles from Miletus, formerly represented by Guzel-Hissar (AIDIN), but now by Inek-bazar. It was placed on the banks of the small river Lethæus, a tributary of the Mæander. The ruins were first explored by Sir W. Gell and the party sent out by the Society of Dilettanti in 1814, and visited by W. Hamilton, who discovered the remains of the celebrated octostyle pseudodipteral temple of the Ionic order, dedicated to Artemis (Diana) Leukophryene, attributed by VITRUVIUS, iii, 1, to HERMOGENES of Alabanda; and vii, Pref., says that he left a treatise on that structure. The peristyle was nearly two hundred feet in length and the columns more than 4 ft. 6 in. in diameter; LEAKE, *Asia Minor*, 8vo., London, 1824, p. 242-3, 349. SOCIETY OF DILETTANTI, *Antiquities of Ionia*, fol., London, 1840, iii, 69, refers to the magnificence of it over that at APHRODISIAS: and drawings of the ruins remain among that society's papers. The sculptures of the temple were removed 1851, under the auspices of C. Texier, (CIVIL ENGINEER, etc., *Journal*, 1843, vi, 30,) who thereby destroyed it, to the courtyard of the Louvre at Paris. There are also an agora and two theatres, with considerable traces of the scene and parascene, as stated by DONALDSON, in STUART and REVETT, *Antiq. of Athens*, etc., fol., London, 1830, iv, 35. ARUNDELL, *Asia Minor*, 8vo., London, 1834, ii, 243, and his *Seven Churches*, p. 58; TEXIER, *Asie Mineure*, 8vo., Paris, 1862, who describes it, i, 349; J. A. CRAMER, *Asia Minor*, 8vo., Oxford, 1832, i, 459. 23.

MAGNESIAN LIMESTONE. The beds of this formation (also called DOLOMITE, and containing carbonate of lime) constitute the lower part of the new red sandstone series. The beds which skirt and overlie the coal measures wherever they appear in this country, are found chiefly extending from the mouth of the river Tyne, along the eastern side of Durham and Bishops Auckland, by Ripon, Sherburn, Doncaster, Mansfield, and Nottingham, in an average width of four or five miles. Passing round by Derby they appear again at Uttoxeter, skirting the Potteries coal field by Lane-end to Congleton, and proceed by Macclesfield, Manchester, Newton, Liverpool, Ormskirk, and Preston, with an average breadth of two miles. Another extensive range commences at Wrexham, and after skirting the Flintshire, and the various Shropshire, coal districts, it proceeds down the Malvern hills through the saliferous district of Worcestershire to the eastern side of the Forest of Dean. A wide crescent of magnesian limestone belts the Whitehaven coal-field on the north side. A large bay in the Tanworth coal-field is entirely filled by it; and the Dudley coal-field is entirely surrounded by a belt averaging three miles in breadth. It skirts in patches the southern boundary of the South Wales coal-field, and appears hanging on the sides and overlying the edges of all the older rocks throughout the Bristol and Somersetshire coal-fields.

The structure of magnesian limestone varies considerably; from a fine grained crystalline sub-coolitic rock to a coarse

MAHOMEDAN ARCHITECTURE. The architecture which, chiefly owing its origin to Roman, Greco-Roman, or Byzantine, materials and practice (the Hindoo are not to be forgotten), became in the course of centuries in Spain, Africa, Egypt, Syria, Persia, Sicily, India, and Turkey, a tolerably homogeneous and complete style, "though never losing entirely those local peculiarities which it received from the earliest styles out of which it arose," as observed by FERGUSSON, *Ill. Handbook*, 8vo., London, 1855, i, 379. His opinion, that the uniformity was due to the alteration of old methods for the purposes of the new religion, and to intercommunication from community of religion, may not be satisfactory to all critics; but no other work contains so lucid a sketch of the progress of this (which he calls "Saracenic") architecture in the different countries.

Amongst matters which require notice are the insufficiency of information on the art of the Mahomedans in *Syria*: the early and inveterate use (except as hereafter mentioned) of the pointed arch with sides nearly straight at the summit; the historical and traditional accounts of the employment of Christian architects from the rebuilding of the kaaba (JACOUB) to the erection (*cir.* 876) of the mosque of Touloun at Cairo, with its earliest (in *Egypt*) of minarets; the complete foundation of the new style, with its geometrical tracery and ornaments, in that mosque; the origin therein of arcades across, instead of along, the mosque; the style almost entirely changed in the middle of the twelfth century, in fact, "a purely Arabic elaboration of the Byzantine style, with a gradual introduction of a Tartar element under the Mameluke sultans. In Persia the same was probably the case;" FERGUSSON, i, 412.

To these must be added the absence of such work in *Persia* older than the twelfth century; the influence of **ARMENIAN ARCHITECTURE** after the ruin 1064 and 1386 of ANI; the change of style with polychromatic decoration about the thirteenth century; the purity of the dome (pointed-arched in section externally and internally) of the mosque (1303-16, not 1577-85 as in *TEXIER*), at Sultanieh; and the double dome (bulb-shaped) prevalent during the sixteenth and seventeenth centuries.

Moreover due prominence must be given to the same author's assertion, i, 413, that in *India* "the Arabic phase is entirely lost; and when we first meet with examples of Mahomedan architecture in this country, it is a Tartar form of the older Sassanian art. Those Moslems who conquered India were, from first to last, of Tartar origin—Toorks, Pathans, and Moguls;" * * * "and the consequence is, that we find there a combination of Tartar and Hindu architecture, differing in many essential points from all other forms of Saracenic art, though resembling the Persian more than any other. The principal local difference arises from its being founded on the Hindu, or rather on the Jaina style." The resemblance of the ornaments carved on the pine-wood gates of the tomb of Mahmoud at Ghuzni (977-1030) with those of the mosque of Touloun, shows the similarity of decoration within a century at the extremities of the Mahomedan empire: and it appears in the mosque at Old Delhi that neither the Afghan conquerors (1196-1235) nor their new subjects knew how to construct the pointed arch, but made the upper part of it with slabs (a purely Greek notion) till about 1397-1478. The expression of strength combined with refinement in the Pathan works, about 1360-1460, at Jaunpore, Gour, and Mandoo, is different from the (1412-43) mixture of the elaborate forms of JAIN art with the larger and taller proportions of the Mahomedan work at Ahmedabad; but in 1494 the Moguls found the style "wholly emancipated from the trammels of Indian art, from which it had sprung, and forming in itself a complete and uniform system almost without any foreign admixture," which continued, with the exception of the personal taste of Akbar (1556-1605), in his palace and mosque at Futehpore Sicri and his tomb at Secundra, for two centuries, but had already become corrupted at the accession 1685 of Aurungzebe. Among the other principal works of the Pathan period (1193-1495) may be mentioned

mosques at Ahmedabad, Canouge, Delhi, Dhar, and Gour; mosques and tombs at Delhi; a mosque and a palace at Mandoo; while among those of the Mongols (1495-1800) may be cited mosques at Hyderabad and Oude; palaces and tombs at Agra, Beejapore, and Delhi; a mosque and tombs at Mandoo; with tombs at Allahabad, Aurungabad, Dacca, Jaunpore, and Patna, and at Seringapatam so late as 1782.

Belonging to the late part of the Pathan period are those early pendentives which, assuming the shape of super-imposed ranges of corbelled arcades, intimate the natural source of the work seen in *Sicily*, (that evidently was done by Mahomedan workmen, although historians generally agree, as noted in FERGUSSON, i, 463, that nothing now remains anterior to the Norman conquest 1039-90); as circa 1200 at La Ziza, *Illustrations*, Corbel, pl. 53, which is not so good as in Spain.

So little is known of the northern coast of *Africa*, that in this article it is best to assume that the early works were more related to the Egyptian than to the Spanish form, and to refer to LEWIS, *Notes*, and GIRAULT DE PRANGEY, *Essai*, as mentioned at the end of this article.

The remarkable exceptions above mentioned occur in *Spain*. Even so late as 965 workmen were obtained from Constantinople for the sanctuary at Cordova, and there at an age when the employment of the (true or false) pointed arch "was universal in the east, it is singular to observe how completely the Saracenic architects followed the traditions of the country in which they found themselves. At Cordova they never threw off the influence of the Roman arch, though farther north the pointed arch is by no means uncommon." To these may be added that the Spanish Mahomedans, although working almost wholly from Roman models, never adopted the dome to any extent, except perhaps as a roof in baths: FERGUSSON, i, 454-7. He takes the types of undegraded Spanish work as shown in five examples:—1, the early part 786 of the mosque at Cordova; 2, the church of S. Christo de la Luz at Toledo; 3, (the most perfect) the later part 938 of the mosque at Cordova; 4, the church of Sta. Maria la Blanca at Toledo, without any trace of Roman or Byzantine art; and, 5, the palaces at Seville and Granada. The transitional stage at Seville seems to date 1090-1248, and to have been introduced from Fez, Morocco, and Rabat; the last stage is that of the Alhambra 1218-92, with corbel work from about 1356.

A fourth remarkable exception is, that in *Turkey*, the conquerors 1453 of Constantinople forgot and abandoned the light piers, pointed arches, airy domes, coloured walls, and gilded roofs of Asia Minor; "if a pointed arch is there found it is an accident; colour is rarely used, externally at least; the plan and form of their mosques is entirely new to them; and a new style springs up, differing in almost every important characteristic from anything ever practised by a Mahomedan people before; they do not even seem to have employed the Greek architects of that day," but on this point reference should be made to the article CHRISTODOULOS. Between 1610 (its highest point) and 1670 the style had received its death-blow.

After the scattered encomiums passed by FERGUSSON upon these varied and varying forms of architecture, and after his balanced judgment, p. 469, it seems desirable to notice views that might excuse, if not cause, prejudice against these phases; such occur in FREEMAN, *History of Architecture*, 8vo., London, 1849, p. 270-2, who says that "the style is rich, wonderful, and calculated to enchant at first sight." * * * "that it is the exuberance of a fancy, vivid and fertile to the last degree, but uncontrolled by any law of taste or consistency, part of the charm of this art (which he calls Arabian) consists in the excessive richness and gorgeousness of its buildings * * * this splendour is mere barbaric magnificence superadded to fantastic and inconsistent forms, lifeless germs which existed for ages without developing into the features which would seem to be their natural results;" because it "possessed the pointed arch for twelve hundred years, using it systematically as a favourite

form, and yet has not superadded one of the mouldings which can alone render it tolerable to the eye" (of a Gothic critic). The Mahomedan fashion in architecture at present is evidently European. ARABO-BYZANTINE; ARABO-MOESQUE; ARABO-PERSIAN; ARABO-TEDESCO; BYZANTINE; BYZANTINE-ARMENIAN; BYZANTINE-PERSIAN; BYZANTINE-SARACENIC; CORBEL; DOME; MOESQUE; SICULO-BYZANTINE; SICULO-NORMAN.

FERGUSON, *Jerusalem*, 8vo., London, 1847: BURTON, *Journey from El-Medina to Mecca*, in the ROYAL GEOGRAPHICAL SOCIETY, *Journal*, 8vo., London, 1855: COSTE, *Architecture Arabe, ou Monumens du Kaire*, fol., Paris, 1824: BOURJOIN, *Les Arts Arabes*, fol., Paris, 1868, in progress: DANIELL, *Oriental Scenery*, 5 series, fol., London, 1795-1815; *Views in Hindostan*, fol., London, 1805; *Antiquities of India*, fol., London, 1799: GRINDLAY, *Architecture, &c., chiefly of the Western side of India*, fol., London, 1826-30: FORREST, *Pict. Tour along the Ganges and Jumna*, 4to., London, 1822: TEXIER, *Arménie, Perse, et Mésopotamie*, fol., Paris, 1842: FLANDIN et COSTE, *Voyage en Perse*, fol., Paris, 1812-54: FERGUSON, *Pict. Illustrations of Hindostan*, fol., London, 1817: HITTORFF et ZANTH, *Architecture Moderne de la Sicile*, fol., Paris, 1825: LEWIS, *Notes on the Celtic, Roman, Moorish, and other remains in Algeria*, in the *Transactions of the Royal Institute of British Architects*, 1868-69: and CRACE, *Ornamental Features of Arab Arch. in Egypt and Syria*, in the same *Trans.*, 1869-70: MURPHY, *Arabian Antiquities of Spain*, fol., London, 1813: OWEN JONES and GOURY, *Alhambra*, 2 vols., fol., London, 1838-42: GIRAULT DE PRANGY, *Monuments Arabes de Cordoue, &c.*, fol., Paris, 1840; and his *Essai sur l'Arch. des Arabes en Espagne*, 8vo., Paris, 1841.

MAIANO (G. and B. DE), see MAJANO.

MAIDSTONE QUARRY, see KENTISH RAG STONE. FREE-STONE (p. 93). GREENSAND.

MAIGNAUD. An error in some writers for MIGNARD.

MAILLET DE BOULLAY (CHARLES FELIX), was born 1795 at Rouen. He studied under Percier and Leclère; in 1820 he gained a departmental prize, and was appointed architect to the department of Seine Inférieure. At Rouen he designed the hôtel de ville and the church of S. Paul; was engaged 1832 upon the restoration of the church of S. Ouen; and carried on the building of the piers of the new bridge in that city. The date of his death has not been found. 68.

MAILURAM, see MAHAHALIPOORAM.

MAIN COUPLE. A term used in the north of Great Britain for a truss in a roof: COUPLE. 1. 2.

MAINERI (STEFANO). This name appears under the date 14 Sept. 1399 in the list of architects employed on the cathedral at Milan. 27.

MAINERIUS. In the registers of the abbey of Villeloin, or Villeloup (*Villa Lupa*) in the diocese of Tours, occur the following entries: "Kal. Jan. obiit Maynardus, edificator nostri hujus loci, 8 Idus Augusti obiit Mainerus edificator nostri loci." RAMÉE, *Histoire*, 8vo., Paris, 1813, p. 143. 56.

MAINTAIN, To. A term generally used in conjunction with "repair, sustain, support, and uphold," constituting one of the express covenants of leases of premises.

MAINWARING (BOULTON), of Bedford Row, was surveyor to the new buildings of the London Hospital, Whitechapel Road, erected 1758-9 or 1761-66, at a cost of about £18,500: To Joel Johnson, a governor and the carpenter employed, the credit is given in MILIZIA, *Lives*, edit. 1826, p. 392; the CROWLEY PENNANT in the print room of the British Museum has a view of the front. He resigned 4 December 1771, on account of advanced age and bad health. Andrew Thorntwaite was a pupil.

MAINZ (the Moguntiacum of the Romans; It. *Magonza*; Fr. *Mayence*; Engl. *Mentz*). A town in Hesse Darmstadt, situated on the left bank of the river Rhine, opposite the mouth of the river Main. About a mile distant is the Roman aqueduct of Zahlbach; this with the tower of Drusus in the cita-

del, are the only ancient works except the collection in the museum. The town is walled, defended by a citadel with outworks, and was one of the fortresses of the German confederation, holding a garrison of 8000 men. A bridge of boats above 1600 ft. long connects it with its fortified suburb of Castel. The railway girder bridge 1860-Dec. 1862 is 1212 ft. long, and cost 1,765,000 florins, or £147,083, and 1,050,000 fl. or £87,500 for contingent works; its details are given in the *ENGINEER Journal*, 1867, p. 508, 532. The houses are generally lofty (two of early date are given in MOLLER, pl. 52); among the chief ones are the residences of the Stadion, Ostein, Bassenheim, and Etz, families; many of the streets are narrow. The promenade or *Neue Anlage*, outside the gates, forms extensive public gardens well laid out.

The cathedral dedicated to S. Martin is, from its numerous restorations, one of the most remarkable buildings in the history of art. The eastern choir dates 978-1009 (door in MOLLER, pl. 6), the building was burnt on the day of its consecration. The two eastern towers and the contiguous portion of the nave date 1009-37; MOLLER gives pl. 9 the capitals in the chapter house. Again being burnt 1137 and in 1191, the nave walls and arches were restored. The transept was consecrated 1228; and the polygonal western choir 1239. The side chapels date about 1260, those on the north side, finished about 1291, and those on the south side about 1332, contain many rich windows; the allerheiligen capelle dates 1317 (MOLLER, pl. 44). The present large cloister was rebuilt 1397-1412 (door in MOLLER, pl. 54, with view), the chapter house or *menemonie*, a portion of the late romanesque cloister dates 1213. In 1756 another fire destroyed the roof of the principal or western tower, including all the smaller towers, after which, 1767 they were roofed with stone, as well as the whole of the west end, by Neumann of Wurzburg. During the siege of 1793 a sixth fire destroyed all that was combustible. In 1803 Napoleon ordered its restoration; the nave was roofed 1822 under Arnold, and the adjoining parts 1825. In 1828 G. Moller of Darmstadt designed the iron cupola for the east tower, 44 ft. 3 ins. in diameter and the same in height; the restoration, completed 1831, is said to be the best of its kind. The double chapel of S. Gothard at the end of the north-west transept dates 1135-36. The pulpit and a great number of the tombs of the bishops electors deserve attention (one 1320 is given in MOLLER, pl. 45). RAMÉE, *Histoire*, 8vo., Paris, 1843, ii, p. 385, gives a plan.

The collegiate church of S. Stephen and S. Mary Magdalene was begun 1317; it consists of an apsidal chancel, a nave of three bays, with aisles of almost equal height (an uncommon occurrence on the Rhine), a lofty west tower square below and octagon above, with the nave extending one bay west of the tower. It was much damaged in the siege of 1793. The small cloister dating about the middle of the fifteenth century, has pendant keystones which are uncommon in the locality; an elevation of a stone stall canopy is given in *BUILDER Journal*, 1851, ix, 766: some capitals are given in MOLLER, pl. 38. These two buildings with the church of S. Quirinus are given in two plates by KING, *Study Book*, 4to., London, 1858-68, ii. The church of S. Quentin, begun about 1317, has three aisles of almost equal height; the middle one is 36 ft. wide in the clear and 65 ft. high; the side aisles 14 ft. wide; the slender and square piers are 20 ft. apart; the whole is covered by a massive vaulting 8 or 9 ins. thick of tufa, between walls of only 4 ft. in thickness without buttresses. To the church of S. Emmeran the date 1397-1412 or otherwise 1450 is assigned. The vaulted church of S. Peter dating between 1724-68, is much praised by LASSAULX in WHEWELL, *Architectural Notes*, 8vo., London, 1812, p. 151: plans and sections are given in the ALLGEMEINE BAUZEITUNG *Journal*, 1846, 132-7-9. WEBB, *Ecclesiology*, 8vo., London, 1847, p. 87, mentions two other vaulted churches.

The other chief buildings are,—the merchants' hall, formerly the electoral palace (kurfürstliche schloss); the old merchants'

hall 1255-1313 (described by MÖLLER, pl. 39-43) was pulled down 1812: the Deutsche haus or Grossherzogliche schloss, the grand ducal castle, now the governor's palace: the courts of justice in the former Dalbergische palast: the building containing the library, the museum rich in stone monuments of the Roman and of the Middle Ages, especially some capitals from the palace of Charlemagne at Ingelheim; several good collections, pictures, &c.: the theatre by G. Möller: and the casino or reading-room, covering the site of the house of John Gensfleisch, better known as Gutenberg, the inventor of movable type; the house in which he was born and the house which contained his first printing office still exist; a bronze statue of him by Thorwaldsen is near the theatre. A statue to Schiller was erected 1862. The fruit market, 200 ft. long by 100 ft. wide with side corridors in addition, having a timber roof in one span, is given in the *BAUZEITUNG Journal*, 1839, pl. 286, p. 53. Most of the buildings are erected of the HOMMARTIN STONE.

The suburb Castel, the site of a Roman castellum, contains a Protestant church, and the new Austrian barracks (1837); a railway connects it with Wiesbaden, the museum at which place is worth visiting.

LANGER, *Malerische Ansichten*, fol., Frankfurt, 1836. C. R. SMITH, *Antiq. of Trèves*, &c., 8vo., London, 1851. WETTER, *Geschichte und Beschreibung des domes zu M.*, 8vo., M., 1835. GAILHABAUD, *Monuments*, 4to., Paris, 1850, ii, gives the cathedral. KALLENBACH, *Chronologie*, fol., Munich, 1846. EMDEN, *Dom zu M.*, photographs, 4to., M., 1858. KLEIN, *Mainz und seine Umgebungen*, 8vo., M., 1857; *Die römischen Denkmäler in und bei Mainz*, 8vo., M., 1861; and *Geschichte von Mainz*, 1792-93, 8vo., M., 1861. KLEINER, *Représentation du château de la Favorite, de son altesse électorale de Mayence*, fol., Augsburg, 1726. 7. 28. 50. 96.

MAINZ (JACOB VON) was baumeister to the church of S. Victor at Xanten, 1356-60; for some reason he went to Prussia, but returned 1361 to the same employment, which he held until his death 1374. His brother HEINRICH occupied his place during his absence. 92. 116.

MAIRE (. . . DE LA OR LE), designed 1697-1706, or 1706, at Paris, the colonnade of the great court, and the façade which contains the great staircase, of the hôtel de Soubise (now part of the palais des archives) on site of the hôtel de Clisson, for François de Rohan, prince de Soubise; although he lived until 1745, the interior was done 1735-40 by G. Boffrand: BRICE, *Nouv. Descr. de Paris*, 12mo., Paris, 1725, ii, 87, and gives a bird's eye view of the edifice. Le Maire appears to have been one of the most powerful promoters of those fashions which about 1730-60 succeeded to that of Bérain, "il semble avoir créé ce qu'on appelle le style rocaille," ROUYER and DARCEL, *L'Art Architectural*, 4to., Paris, 1863-66, ii, 59. In BLONDEL, *Cours*, 8vo., Paris, 1772, iii, 106, pl. 16, 24; ii, 194, 199, are comments on his style. BLONDEL, *Discours*, 4to., Paris, 1754, p. 77. This building, with the adjoining hôtel de Rohan, also by Le Maire, are illustrated in BLONDEL, *Arch. Franç.*, fol., Paris, 1752-6, ii, 156-64. He also designed the hôtel de Pompadour, rue de Grenelle-S. Germain, occupied in 1727 by the bishop of Rennes; given in the *Arch. Franç.*, i, 236-7. The hôtel de Duras, rue du Faubourg S. Honoré, was attributed to Le Maire in *Arch. Franç.*, i, 242, 236; but iii, 153, corrects the name to that of G. Boffrand. The last few years of his life he devoted to writing upon architecture, but BLONDEL, i, 226, could not say into whose hands the papers had passed; he commenced a plan for the improvements of the city; and died 1745 at Châteny, near Paris.

MAIRE WOOD. A fancy wood of New Zealand, which when cut in the direction of the grain, is of a yellow stone colour variegated in parts with dark brown of large pattern. It is close in grain and hard, and receives a fine polish. The price in 1846 was twenty pounds a ton; *BUILDER Journal*, iv, 446.

MAIRIE. The French term for the court and offices of a mayor's residence.

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MAIRTEE. The native name of the wood of the Pentaptera coriaceæ, obtained in the forests of Malabar; it is very durable, and therefore used in house, ship, and boat-building. 71.

MAISA. The architect of the cathedral at Kutais; DUBOIS DE MONTFERREUX, *Voyage en Caucase*, 8vo. and fol., Paris, 1839-43, i, 421. ARMENIAN ARCHITECTURE.

MAISON DIEU, or God's House. An hospital for sick persons. The Domus Dei, or Maison Dieu, at Dover, otherwise called the hospital of S. Mary, was a religious house for the entertainment and relief of pilgrims and travellers, founded and endowed (circa 1201-13) in the reign of king John, by Hubert de Burgh, constable of Dover castle; the present hall appears to be of the date of Edward I (1272-1307); it is 127 ft. long, 80 ft. wide, and 40 ft. high to the ridge; and was restored 1859 by A. Poynter and W. Burges; a description and view are given in *BUILDER Journal*, 1861, xix, 596.

MAISONS (PIERRE DES), see DESMAISONS (P.)

MAISTRE (. . . LE), was elected 1698 member of the Academy of Architecture at Paris.

MAISTRE (. . . LE), his son, was elected 1699 member of the Academy of Architecture, at Paris. A. A. Guillaumot, alive in 1855, was a pupil of a Le Maistre.

MAITANI (LORENZO) was born about 1240 at Siena; and having completed 1290 the façade of the cathedral of that city, he designed 13th November 1290, the cathedral at Orvieto, and superintended the works for forty years, as well as the execution of the sculptures, bronzes, etc. CIOGNARA, *Storia*, fol., Venice, 1813-8, i, 199, pl. 3 and 6, gives the façades of both edifices. DELLA VALLE, *Storia del duomo*, 4to., Rome, 1791, p. 271, 380; gives p. 274, his epitaph and date of death 1330; when his two sons Niccola and Vitale were appointed to superintend the works, with Meo di Orvieto as *capo maestro*. 67. 112.

MAJANO (BENEDETTO DA). It is certain that GIULIANO, mentioned in the following article, had a brother Benedetto, because they acquired 1470 a burial-place in the crypt of S. Lorenzo, at Florence; and consequently editors have ventured to alter 'uncle' and 'nephew' into 'brothers' in the account given of a Benedetto by VASARI, who is here followed because he knew the private affairs of the family. BENEDETTO, born 1444, was established at Florence, where he continued his grandfather's business as a decorative mason, and his uncle Giuliano's use of *intarsiatura*, besides practising as a sculptor. As an architect, he went with Giuliano to Loreto where he continued his uncle's re-edification of the church till apparently about 1495 or 1497, when G. Giamberti was engaged to construct the cupola completed 13 May, 1500. A long account is given by VASARI of his chief works, including the marble pulpit in the church of Sta. Croce (published by LASINIO, *Il Pergamo scolpito*, fol., Florence, 1823); the model upon which the Strozzi palace in that city was commenced 1489 but continued by Pollajuolo and others (GRANDJEAN and FAMIN, *Arch. Toscane*, fol., Paris, 1836, pl. 15, etc.); the heavy wall with a false bearing over the hall of the Dugento in the palace of the Signoria; all at Florence: the portico to the church of Madonna delle Grazie at Arezzo (1475): and a chapel by the side of the road from Prato to Florence, on an estate which he had purchased about half a mile from Prato. He remained some time at Naples executing *Tarsia* under Giuliano; and, after at visit to Hungary, went again to Naples as heir to his uncle. He died 1498 at Florence, while largely engaged in preparing marbles for Naples, in his fifty-fourth year; he was buried in S. Lorenzo, leaving the reversion of his property, after the death of some relatives, to the fraternità del Bigallo. BORGHINI, *Il riposo*, 4to., Florence, 1584, p. 353. 73.

MAJANO (GIULIANO DA), and his brothers, GIOVANNI and BENEDETTO, were sons of Nardo (for Leonardo), first a mason at Majano on the heights of Fiesole, and later a dealer at Florence in ornamental work in stone and marble. The dates

1377-1447 given by MILIZIA for Giuliano are absurd; those of 1407-77 in LETAROUILLY are wrong; and 1432 inserted in the notes to VASARI seems to be at least twelve years too late for his birth. He commenced business as a cabinet maker, employing extensively (*intarsiatura*) an inlay of tinted and shadowed woods. The accounts, of his architectural success, as usually taken from VASARI, are erroneous. When Brunellesco died 1446 at Florence, Giuliano, then only 26 years old at the most, could scarcely have immediately succeeded him as *capo-maestro* to the duomo, but he certainly held the appointment, being succeeded, 17 September 1491, by L. Fancelli: GAYE, *Carteggio*, 8vo., Florence, 1839, i, 300-3. To the period 1446-64 may be ascribed that tabernacle of the Virgin, which was the joint work of the three brothers in the nunnery of S. Vincenzo near Prato; BALDANZI, *La Madonna dell' Ulivo*, Prato, 1838.

Giuliano was invited from Florence (not from Naples) to Rome 1464 (VASARI in v. Vellano) for the service of Paul II (1464-71), for whom he executed in the first court of the basilica of S. Pietro, a building with three tiers of columns which, in the time of VASARI, held on the ground floor the signet-office, etc.; on the first floor, the apartments of the Datary and of some prelates, and on the third floor some apartments of the Vatican. This was not, as erroneously imagined by MILIZIA, the cortile di S. Damaso that was really the work of Bramante and Raffaele. The marble loggia di benedizione in the front of the old church of S. Peter's was also his work, destroyed 1607; BONANNI, *Vaticanium*, fol., Rome, 1696, pp. 173, 183, pl. 61. At Rome, also, he repaired about 1468 the chiesa di S. Marco (later restored again by O. Turriani) adding the façade, and built the contiguous palazzo di S. Marco now called di Venezia because Pius IV, the last pope who resided there, assigned it as the lodging for the ambassadors of Venice, so that in later times it has been used by those of Austria. Views of the cortile are given in ROSSINI, *Monumenti*, fol., Rome, n. d., pl. 14 and 52; plans of the church and palace, with views and details, are given pl. 73-78 of LETAROUILLY, *Rome moderne*, 4to., Paris, 1840, pp. 215-221; he assigns the adjoining "little palace of Venice" to B. Pintelli. For the same pontiff he began to enlarge the chiesa della Sta. Casa, at Loreto, but after carrying the work up to the height of the plinth, he left the rest to the care of his nephew BENEDETTO.

It is possible that he found his way to employment as the court-architect at Naples on the death of this client rather than at the earlier period 1458-64 indicated by VASARI, who is not responsible for the errors which other authors have made in supposing that Giuliano worked for Alfonso I (1441-58) father of Ferdinand I (1458-94) whereas VASARI expressly says "Alfonso who was then duke of Calabria," a title never used by Alfonso I, but enjoyed by Alfonso II as son of Ferdinand I for a long time before his accession 1494. Ferdinand I extended his capital toward the east from the Carmine to S. Giovanni ai Carbonari, and employed Giuliano to fortify the new wall: the king also opened new gates, placing his statue on each of them; one was the porta Capuana built of white marble, ascribed to Giuliano by VASARI, who erroneously also gives to him the credit of the triumphal arch erected 1443 by P. di Martino for Alfonso I in the Castel Nuovo, where the Corinthian Order was employed by Giuliano on the façade of the church of Sta. Barbara. The duke built in the long avenue outside the porta Capuana, called *poggio reale*, a palace with gardens extending to the sea, which is now hardly known except by its plan preserved in SERLIO, *Architettura*, fol., Venice, 1663, p. 223. This palace, its fountains and aqueducts, and many public and private fountains in the city itself, are ascribed to Giuliano by VASARI, who states that he died at Naples at the age of 70 years (an approximate date in 1490 is given by GAYE, i, 300-3), his works being continued by P. and I. del Donzello (busy before 1481 at Naples) with decorations supplied till 1498 from Florence by Benedetto. 28. 30. 73. 95.

MAKSOOREH or MAKSOUREH. The Arabic term for a private, or reserved, place according to HERBELLOT, *Bibliothèque Orientale*, fol., Paris, 1697, p. 537, who says s. v. Macsurah, "lieu séparé, dans les mosquées, où se placent les princes pour assister aux prières." Evidently his definition contains a general, and also a special, meaning of the term. The capilla de S. Pedro or del Zancarron at Cordova is called the maksourah or sanctuary, by GIRAULT DE PRANGEY, *Arch. des Arabes*, etc., 8vo., Paris, 1841, p. 43; and by MURPHY, *Arabian Antiq.*, fol., London, 1813, who however terms the screen before it the "mikrab or chancel": whereas the maksourah (as described by MURPHY, *History*, 4to., London, 1816, pp. 173 and 181, copied by GIRAULT, p. 48) is really the part that might be termed the chancel, which is separated from the rest of a mosque by a partition (perhaps the original maksoreh itself, as in the case of the Lat. Cancelli) that is closed at night, where the edifice is not shut after sunset. Princes attending the services would be ushered into such a chancel: and then HERBELLOT's definition as a whole would be good: but it appears that in the course of time the special meaning was preferred, so that maksoreh meant the prince's mahfil or pew. This is adopted by SALZENBERG, *Christlichen Baudenkmale*, fol., Berlin, 1854 (who applies it to the mahfil homayoun) as it had previously been by CONDÉ, *Domination*, etc., 8vo., Paris, 1825, i, 509, who states that "la maksourah était une tribune un peu élevée au-dessus du sol, placée dans la partie principale de la mosquée, et entourée de grilles dorées. C'était là que se plaçait le prince pour assister aux prières." This occurs as a note in ii, 2, of the English edition, 1854; which at ii, 465, describes the moveable maksourah and the corresponding mimbar made 1147-8 for king Abdulmumen Ben Ali at Morocco.

A long note is given by GIRAULT, p. 43-44, to correct the error which he considered occurred in the remarks in his earlier *Atlas*, where he had followed the first of the passages above cited from CONDÉ: this note shows that in the mosque at Cordova the southern chapel west (as p. 44 and not east as p. 47) of the kibleh was known as the maksourah of the caliph, but not so the capilla de N. S. de Villaviciosa (although the latter is called the caliph's seat in MURPHY, *Arabian Ant.*, and maksourah or seat of the caliphs in FORD, *Handbook*), which is much in advance of that chapel, and is now understood to have been either the mahfil of the imam khatib according to GIRAULT, p. 71, or the place where the law was discussed by the doctors or imams, according to LIAGUNO, *Noticias*, 4to., Madrid, 1829, ii, 189.

MALACHITE. A mineral found usually in copper incrustations. It takes a high polish.

Blue malachite, is blue or pure carbonate of copper.

Green malachite, is green carbonate of copper.

Emerald or royal malachite, is diopside of copper, a still rarer green, and the best of all, which is a mixture of copper and silica; or flint and carbonate of lime coloured with oxide of copper.

False or pseudo malachite, is phosphate of copper, soft and silky, and of a rich velvet green marred by black spots or lines, and not so rich as the three kinds of true malachite.

Green malachite usually accompanies other ores of copper, and forms incrustations, which when thick have the colours blended and extremely delicate in their shades and blending. Perfect crystals are quite rare. The mines of Siberia at Nischne Tagilsk have afforded great quantities of this ore. A mine partly disclosed measured at top 9 ft. by 18 ft., and the portion uncovered contained at least half a million pounds of pure malachite. In a mine in the province of Perm, belonging to M. Demidoff, was discovered 1831 a seam 17 ft. 6 ins. long, 8 ft. 2 ins. wide, and 4 ft. 6 ins. high, weighing 120,000 lbs., or 50 tons: the shafts of the 8 Corinthian columns and the pilasters all fluted, 37 ft. 6 ins. high, to the iconostasis in the church of S. Isaac at S. Petersburg were inlaid from this seam. Other noted localities are Chessy in France, Sandlodge in Shetland, Schwartz in the Tyrol, Cornwall, Australia, and the

island of Cuba. At Versailles is a room furnished with tables, chairs, etc., wrought in malachite. The first malachite vase of English make was produced January 1850 at the Penzance serpentine marble works out of stone from South Australia. Mines in county Cork in Ireland are said to have produced fine specimens of this ore. A block of malachite exhibited at Paris 1867, 7 ft. in length, 2 ft. 6 ins. high, and 2 ft. thick, was valued at 75,000 francs. Artificial malachite is noticed in *BUILDER Journal*, 1853, xi, 156.

The SOCIETY OF ARTS, *Transactions*, 8vo., Lond., 1832, p. 38, records the manufacture 1831 of two Corinthian fluted columns 8 ft. high, of malachite, by F. Libitio of Rome, for M. Demidoff. The doors, tables, and vases exhibited at London in the Exhibition of Industry 1851 were sent from Ekatarinburg in Russia. The "malachite gates" were subsequently purchased by Sir Henry Stracey, Bart., and were placed at the entrance to his park at Rackheath, in Norfolk; *NOTES AND QUERIES Journal*, 1858, 2 ser., vi, 70, 100.

ALL THE YEAR ROUND *Journal*, 1862, vii, 561-2. T. W. ATKINSON, *Oriental and Western Siberia*, 8vo., London, 1857-8. LACH SZYRMA, *Revelations of Siberia*, 8vo., London, 1852. S. S. HILL, *Travels*, 8vo., London, 1854. 14. 71.

MALADRERIE QUARRIES (LA), see CAEN STONE.

MALANDRERIE, sometimes written Maladrerie. An old term for an HOSPITAL or ALMSHOUSE for the reception of persons afflicted with leprosy; LAZAR HOUSE.

MALAGA. The Moorish Malakah. The capital of the province of the same name in Spain. So much of the town was built by the Moors that few cities in Spain present, in their general form and structure, an appearance so decidedly Moorish. It is oval in form, being built chiefly along the shore; the streets are generally long, narrow, and winding, with old houses usually of two, three or four stories in height coloured with a white or yellow wash; the chief modern houses line the public walks. The fortifications have nearly disappeared. The river Guadalmedina, a mere brook in summer, enters the sea to the west of the city. The harbour has a massy stone mole 5 furlongs in length, commenced 1 January 1588, with a modern lighthouse at the end. The Moorish atarazana with many towers, or dockyard, is now in the town through the recession of the sea. The best squares are, the plaza mayor or de la constitucion lined with houses of "imposing magnitude," containing on one side the municipal buildings and court-houses; its marble fountain with groups of female figures was made at Genoa and presented to Charles V (1516-56); the plaza de Riego with its fountain; and the plaza de la puerta del Mar. The supply of water from Churriana to the Roman city was revived 1726 by an aqueduct 3000 ft. long with a bridge of twenty-two arches, but was not completed in 1794. Another supply six miles in length with thirty bridges was formed about 1760-90 by Aldehuela. The Roman remains are unimportant. Among the many Moorish works, besides gateways, towers, and other fragments, are the Alcazar or old castle; its lower portion is called Alcazaba and the upper part Gibralfaro from a Roman pharos which is said to have stood on the crest of the hill: the alcazar is said to have been built 1279, or between 1333-43, by the monarch Youssouf-abul-Hadjadj from his own plans and under his own directions; the whole was much ruined in the dreadful siege by Ferdinand 18 August 1487.

The town is the see of a bishop suffragan to Granada. The cathedral dedicated to the Annunciation of the Virgin Mary, commenced 15 or 22 June 1522, is attributed to D. de Siloe who intended to design a temple as then understood, that is, an application internally of the Corinthian order, like his cathedral at Granada. This idea was altered by later architects including D. de Vergara the elder 1563; and D. de Vergara the younger 1582, who did the capilla mayor consecrated 31 August 1588, and began 1592 the coro. P. Diaz Palacios succeeded in 1595 and was at work till 1623, when the edifice seems to have stopped: in 1719 J. Bada resumed the works on a plan of his own, the original one

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having been lost; he executed part of the design by V. Acero approved 15 April 1724; and was succeeded 1756 by A. Ramos, who completed the structure. A marble colonnade in front is flanked by two round towers. The interior has three aisles; it is nearly 400 ft. long, 180 ft. wide, and 125 ft. high; the steeple is 270 ft. high. The nine parish churches are richly decorated: that of Santiago originally a mosque still retains the brick tower. The highly praised tower of Los Martires was finished on Christmas-eve 1548 by B. Perez, according to an inscription now lost but given in LLAGUNA, ii, 41. The elliptic church of S. Filipe Neri was executed on a design furnished about 1778 by V. Rodriguez, by J. M. de Aldehuela, who rearranged the Jesuits' college for the colegio de S. Telmo; erected the *consulado* or Monte Pio, a large pile with a portico of black marble, and the offices; and rebuilt the church of the Augustinians. The twenty-four convents were suppressed in 1835. The bishop's palace is overloaded with sculptures.

Among the usual public buildings are the old custom house, all roof and window, destined for the exchange; the new custom house as massive as a prison, the work of M. Martin Rodriguez, dating about 1785, who also designed some other buildings; the tobacco factory, employing seven hundred persons; the theatre by Masonesqui; a plaza de toros, constructed out of a Franciscan monastery; and of the five hospitals the one called La Caridad with its church of S. Julian, were designed 1688-99 by M. Melendez. There is a cemetery for the Protestants, a circumstance very unusual in Spain. PONZ, *Viage de España*, 2 edit., 8vo., Madrid, 1776-84; CRUZ, *Viage de España*; LABORDE, *Itinéraire de l'Espagne*, fol., Paris, 1827-50; CARTER, *Journey from Gibraltar*; TOWNSEND, *Spain*, 3 vols., 8vo., Lond., 1791; and 1795; ROSCOE, *Tourist in Spain*, 8vo., Lond., 1837, gives a view of the port and cathedral; ROBERTS, *Pict. Sketches in Spain*, fol., London, 1837; SWINBURNE, *Pict. Tour through Spain*, fol., London, 1806, p. 201 with plate; ALLAN, *Pict. Tour*, fol., London, 1843, p. 94; MARZO, *Historia de Malaga*, 2 edit., 8vo., Malaga, 1850, etc. 14. 28. 50. 96.

MALAGOLA (CRISTOFORO), called il Galaverno, designed the chiesa nuova or della B. Virgine del Voto, at Modena, erected after the plague of 1630; the exterior and interior decorations of the church of the nunnery of Sta. Eufemia; and the cupola, colonnades, and altars, of the chiesa del Carmine; and a fine staircase in the casa Caldani: he also altered the church of the nunnery of S. Paolo. The time of his death does not appear in TYRABOSCHI. 93.

MALANAGGIO (IL). A quarry near Pinerolo in Piedmont, which supplies a granite susceptible of being dressed very finely so as to be used in delicate work, and taking a high polish. This granite was the material employed for the bridge over the Doria, a little beyond the porta Vittoria at Turin on the road to Chivasso; no blocks less than from 8 to 9 ft. in length were employed for the cornice and parapet, and some of those used in the latter at the abutment are from 36 to 40 ft. in length. This stone does not discolour from iron spots, as is the fault of that harder and more brittle granite from the quarry of Cumiana, also used at Turin, especially in the ponte di Madre di Dio. 28.

MALARY (. . .) designed 1824-30 the abattoir at Nantes, Loire Inférieure, carried out under the direction of Démolon, sub-architect to the city, at a cost of 830,000 fr.: GOURLIER and others, *Choix d'édifices*, fol., Paris, 1837-44, ii, pl. 205.

MALE and FEMALE JOINT. See JOGGLE. The term is also sometimes given to the junction of pipes where the end of one is placed within another; this is called a SPIGOT AND FAUCET JOINT.

MALFESON (JEAN BAPTISTE), of Gand, designed the *rasphuis* at Gand, one of the best penitentiaries of the day in Europe; and the large warehouses of the entrepôt à l'entrée de la Coupure; their dates and that of his death are not given in the *REVUE DE BRUXELLES*, Oct. 1837, p. 16.

MALINES, see MECHLIN, in Belgium.

MALIOCCHI (GIACOMO). This name appears under the date 14 Sept. 1899, in the list of architects employed on the cathedral at Milan. 27.

MALL (It. *pallamaglio*; Sp. *mallo*; Fr. *mail*; Ger. *mailspiel*). An alley of trees from 300 to 400 toises long by 4 to 5 wide (in English feet 1970 to 2625 long, by 26 to 33 wide), with a level surface bordered on either side by planks fastened on to piles fixed in the earth to the height of a balustrade, and the floor formed with mortar laid on a foundation of stone garrets well rammed. 5.

MALL or MALLET. A sort of hammer made of wood.

Sculptors and masons in carving, use a mallet either of wood or lead for their chisels; for ordinary work the former is a circular block, cut the cross way of the grain to deaden the concussion, with a short stout handle. A mallet of this form is used when laying the first or foundation stone of an edifice on public occasions. The one said to have been used by king Charles II, 1673, at St. Paul's cathedral, London, was presented to the Freemasons' Old Lodge of St. Pauls by Sir C. Wren; NOTES AND QUERIES *Journal*, and BUILDER *Journal*, xxiii, 492.

The carpenter's mallet is somewhat of a cube in shape and varies in size. It was improved 1841 by encasing it with a ferrule of iron $\frac{1}{4}$ to $\frac{1}{2}$ of an inch thick, with the wooden ends protruding; thus a small mallet 3 by 2 ins. on the end is equal in weight to the largest size mallet made entirely of wood; CIVIL ENGINEER, etc., *Journal*, iv, 404. "The commander is a very great wooden mallet with an handle about 3 ft. in length to use in both the hands: it is used to knock in the corners of framed work to set them into their position; also to drive small wooden piles into the ground, etc., or where greater engines may be spared;" MOXON, *Mechanick Exercises* (Carpentry), 4to., London, 1679, p. 128.

The setting mall or maul, formerly called 'heavy beetle' by the paviours, is a block of wood bound with iron at the bottom, an upright handle on the top, with a horizontal one on one side wherewith it is lifted, in order to ram down paving stones.

MALLEABILITY. A property of certain metals, which admits of their being extended by the blows of a hammer or by pressure; in this quality gold exceeds all other metals. Malleable metals are also ductile, that is, they may be drawn into wire. Iron made hot by hammering loses its malleability and cannot be again hammered till it has been annealed. 14.

MALLEABLE GLASS. A means of rendering glass malleable is said, by DION CASSIUS, PETRONIUS ARBITER, ISIDORUS, and PLINY, to have been discovered by an architect in the reign of the emperor Tiberius; again later in that of Louis XIII, as recorded by BLANCOURT, *l'Art de la Verrerie*, 1659. In both cases punishment—in the former that of death—was the only recompense bestowed on the discoverers; and the secret, if any, died with them; LARDNER, *Encyclopædia* (porcelain and glass), 8vo., London, 1832, p. 131. The ENCYCLOPÆDIA BRITANNICA, 7th edit., 1842, x, p. 563, notices the compositions made by Kunckel and by Neumann forming a sort of ductile glass.

The conservator of the museum at Avignon has remarked that all the glass vases found buried at Vaison were so soft and ductile when first discovered that they might be kneaded up and cut with a knife, but that they assumed the fragility and hardness of common glass after a few hours' exposure to the air; FAMILY HERALD *Journal*, i, p. 284. Pieces of glass taken from an old pit 12 ft. deep were found by Colladon to present exactly similar phenomena. KNAPP, *Chemical Technology*, 8vo., London, 1848, ii, 8.

MALLEABLE IRON. The proper name for WROUGHT IRON and BAR IRON. In its perfect condition it is pure iron. It is soft, malleable, and capable of being welded when at a white heat. It melts only at the very highest temperature (above 2000° C.), and when heated and suddenly cooled it retains its softness. Its carbon never exceeds 0.25 per cent. It is

usually produced by the conversion of pig iron, and in rare cases it is obtained direct from the ores. The varieties of malleable iron are distinguished by different names, having reference rather to form and destination than to differences in composition; KELL, *Metalurgy*, transl., by Crookes and Röhrig, 8vo., Lond., 1869, ii, 264. IRON.

Malleable cast iron, or cast malleable iron is annealed cast iron. It is a most useful article, as by means of it the most intricate leaf work can be cast quite flat in a very brittle iron, and after it is annealed the leaves can be bent cold in any way, and with the effect and toughness of hammered iron: strap or iron hinges and such like articles may be obtained in the same metal. IRONWORK. *Useful Metals and their Alloys*, 1857, p. 501.

MALLET. A tool used by masons; see MALL.

MALLET'S BUCKLE'D PLATE. An important contrivance, invented by R. Mallet, for giving in all directions greatly increased stiffness in a thin metal plate, usually square or oblong in shape. The process of manufacture is to strike the flat wrought iron plate between two iron dies, which operation, while leaving the edges, or the "fillets," in their normal flat form, raises the centre from a tenth to a twelfth of the breadth in height, in a curved elevation; thus forming practically flat domes, or groined vaults as they may be called, of very considerable strength. The flat edge or base being screwed down to joists, the buckling makes the plate enormously strong vertically, while the weight is comparatively trifling. It can be used for every purpose where strong, light, rigid, and durable load-sustaining surfaces are demanded, as in forming floors, and for the roadway of bridges, fireproof partitions, coverings, construction of balcony or cantilevered galleries, etc. They are usually placed so that the convex part is compressed and the flat stretched, and when they give way under an excessive load it is usually by the crushing or crippling of the convex part. According to the table of safe loads for buckle'd plates 3 ft. square, published by the inventor, the safe load varies nearly as the square of the thicknesses, which are limited therein, within '048 inch and '375 inch: the factor of safety adopted being 4 for a steady load and 6 for a moving load, the safe loads given in the table for a plate 3 ft. square (the usual size) $\frac{1}{4}$ inch thick, and with 1.75 inch of curvature, are 4.5 tons for a steady load and 3 tons for a moving load. Each of the buckle'd plates used by T. Page, C.E., for the platform of Westminster Bridge measures 84 ins. by 36 ins. with a curvature of 3 $\frac{1}{4}$ ins. and thickness of $\frac{1}{4}$ in.; it bears 17 tons on the centre without giving way. The square form of buckle'd plate, supported and fastened at all the four edges, is the most favourable to strength, as stated by RANKINE, *Civil Engineering*, 8vo., London, 1864, p. 546, who gives the formula for calculations. These plates may be united to each other, or to the frame of the structure they cover, by either lap or butt joints, and by screws, bolts, rivets, or wood screws (to timber), and the joints made water-tight when required by riveting and chinking up, or by interposed strips of felt saturated in oil cement, or in tar and pitch, or by strips of vulcanized India rubber, or by a thin layer of oil putty. The BUILDER *Journal*, 1856, xiv, May 17, gives probably the first advertisement of this important invention, with a wood cut. PRACTICAL MECHANIC *Journal*, v, 234.

MALM BRICK, see BRICK (manufacture of), p. 138.

MALMESBURY (ELFRIC, abbot of), who was promoted to the see of Crediton in 977, and died in 981, either rebuilt or greatly altered the buildings of his abbey; GUG. MALM., in *Anglia Sacra*, fol., London, 1691, ii, 33.

MALMO. The island of this name belonging to Sweden furnishes most excellent GRANITE, as noticed s. v. (p. 78). It is of a clear yellow colour or light brown tone, and is remarkably easily worked, in which respect it resembles the Ornsköldevik granite, which is dark gray in colour and procurable of almost any sizes.

MALOJO (GIAMBATTISTA), of Maleo, near Lodi, made the design for the lower church, or *sotto confessione*, in the cathe-

dral at Milan, which the wardens handed 20 July 1605, for his guidance to the capo-maestro, F. Laurencio; this was commemorated in the inscription on his tomb in the church of S. Domenico, given as No. 846 of VAIRANI. ZIAST, *Notizie*, 4to., Cremona, 1774, ii, 77. 57.

MALPIÈRE (ALEXANDRE JACQUES), born 27 Feb. 1789 at Paris, was a pupil of Hurtault. Besides many houses and other buildings, he 1823-7, jointly with . . . Moutier, rebuilt the royal and parish church (begun by Potain 1787-91; the foundations are shown in PATTE, *Mémoires*, 4to., Paris, 1769, p. 205, pl. 6,) of S. Germain en Laye at a cost of 800,000 fr.; GOURLIER and others, *Choix d'Edifices*, fol., Paris, 1845-50, iii, pl. 98-100. DALY, *Revue Générale*, fol., Paris, 1842, iii, 579; iv, 47: notices the failure of the building. Malpière designed a monument to be erected to the memory of the duke de Berry upon the site of the old Opera House at Paris; and made a design for a monumental fountain for that city. He was a departmental architect, vérificateur-expert of the royal buildings, and directed a school of architecture. The date of his death is uncertain. 110.

MALTESE CROSS. A cross of eight points having the four arms of equal length spreading out from the centre, and indented at the top edge, as shown s. v. Cross, fig. H.

MALTHA (Ital. *maltà*; Fr. *mail*). Maltha, or Greek mastic; a cement made by mixing lime and sand in the manner of mortar, into a proper consistency with milk or size instead of water; SMEATON, *Builder's Manual*, 16mo., London, 1847, p. 123. Panaenus, the cousin of Phidias, lined the inside of the temple to Minerva at Elis with these materials mixed with milk, some saffron being added to give a yellow tinge; "tectorium induxit lacte et croce subactum"; PLINY, *H. N.*, xxxvi, who also describes the Roman maltha as made of fresh burnt lime slaked with wine, well beaten in a mortar with hog's lard and figs; when well made it is very tenacious, becoming in a short time harder than stone; the surface to which it was to be applied being oiled to make it adhere. Another sort, almost equally strong and much cheaper, was prepared by beating up fine slaked lime with pulverized iron scales, and bullock's blood. MOXON, *Mechanick Exercises*, 4to., Lond., 1700, p. 6-7, notices its use at Rome for making mortar with which to line cisterns for water, and also in finishing or plastering of façades to represent stone.

The Indian CHUNAM is called a maltha; the Turkish LUKIUM is perhaps another. A variety of bitumen is likewise called maltha. 5.

MALT-HOUSE. A building, used for converting barley into malt for the purposes of brewing and distilling, consisting of the following principal parts, namely, the cistern or steep, the working floors, and the kiln, together with a store or granary for barley, and another for malt.

The most convenient and usual arrangement is to have the steep at one end of the building with the barley store above it, so that the barley is filled into the steep by means of shoots; the working floors form the centre portion of the building, and at the other end is the drying kiln, with malt store adjoining. All malt-houses are constructed to steep at one time some number of quarters of barley divisible by 15, as that number of quarters is considered to be one man's work, therefore the house is known as a 15, 45, 60, etc., quarter house, as the case may be.

In malting there are three processes: 1, the steeping; 2, the couching and flooring; 3, the kiln drying. The steep, or cistern, is a tank almost always formed of brickwork in cement, rendered inside with cement or lined with tiles or with lead; at the bottom is a drain covered with iron plates finely perforated, and having a cock by means of which the water is allowed to run off, when it is necessary to empty the steep; great care must be taken to have both steep and drain-cock watertight, and a pump, or other means, should be provided to fill the steep with water. To satisfy the Excise regulations, the sides and ends of the steep must be upright, straight, and at right angles; it must

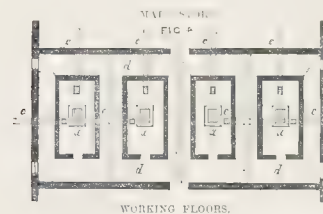
not be of greater depth than 40 inches; must have an even bottom with no more inclination for the drip than half an inch for every foot in length; it must be so placed that the gauging officer can have sufficient light; there must also be a clear space of 4 ft. above the steep, and full and sufficient means for the officer to be able easily and safely to have access to and gauge the corn in every part thereof. The steep 40 ins. in depth is usually about 7 ft. wide, and affording 4½ ft. superficial area for each quarter of barley intended to be steeped at one time.

The working floors, upon which the grain is spread in order that it may be exposed to the action of the atmosphere, require to be so constructed that the temperature can be kept tolerably even; the walls of the building are generally thick, and the windows, which should be placed on both sides of the building, have small narrow side lights glazed, and the centre portion open protected by iron bars, and provided with a shutter to enable the maltster to regulate the supply of air; these shutters are best hung at the bottom so as to fall downwards, and have a chain and hook to hold them open at any required distance, and a button to keep them shut. Much difference of opinion exists respecting the best material for the floors, some maltsters prefer cement, others asphalt, but the balance of evidence is in favour of paving tiles, as they retain some portion of moisture and give it out again to the grain; they should be laid on concrete and jointed in cement. When the building, as is now usually the case, consists of three or more floors in height, the upper ones are constructed either with iron girders and columns and brick arches, or of timber beams supported by iron columns and joists upon which concrete is laid on boards or laths and covered with tiles, or the concrete is floated up with Portland cement. It is usual to run a cement skirting round all the floors about one foot in depth with the top edge bevelled. The most convenient arrangement is to have three floors, and the steep on the middle floor, as by this arrangement there is less labour in throwing the barley from the "couch" to the working floors. A portion of the floor next the steep must be arranged to form the "couch," which is a place in which the grain, having been drained of superfluous moisture, is transferred from the steep to be a second time gauged by the Excise officer. It must by law be close to the steep, must be made with the sides and bottoms straight and at right angles to each other; three sides must be permanently made, and the other side formed by movable boards of the substance of 2 ins. in thickness at least, and so supported and strengthened that it shall preserve the same shape when filled with corn as it has when empty; the depth must not exceed 30 ins; the "couch" boards are therefore always made of this depth, and the area enclosed requires to be about 5½ ft. superficial for every quarter steeped at one time.

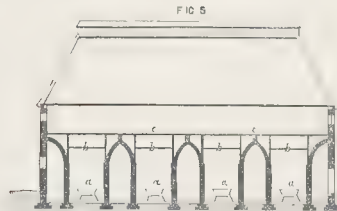
The working floors should be wide in proportion to their length, and should together contain an area equivalent to 200 ft. superficial for every quarter of barley steeped at one time; this area will admit of several pieces being upon the floors at one time. In cold weather the barley requires to lay longer than when the temperature is higher, and if sufficient floor room be not provided the steep cannot be constantly in use, time and rent will therefore be lost; some houses, however, have only from 150 to 170 ft. superficial per quarter, and the maltster has then to take the risk of loss in cold weather.

The grain having lain a sufficient time upon the floors, the next process is to dry it in order to stop the progress of germination, and to preserve the qualities which it received in the former processes. This operation is done in the kiln, which consists of the furnace, the dunge in which the fuel is stored, the disperser or lantern, the floor, the chamber, and the cowl. The area of floor should be about 20 to 25 ft. superficial for every quarter to be dried. Several materials are used for the kiln floor: such as malting tiles, wove iron wire (largely made by Messrs. Bedford and Steer of Long Lane, Borough, and by Bryan Corcoran, Sun Wharf, Ratcliffe, both of London), and perforated cast iron plates; all of these have their advocates,

but malting tiles are more generally approved; those made by Fison, at Stowmarket, being greatly esteemed. These tiles are laid upon iron bars 2 ins. by $\frac{3}{4}$ in. laid flat, 12 ins. apart from centre to centre, supported by two tiers of wrought iron bars, 3 ins. by $\frac{3}{4}$ in. laid on edge, crossing each other in both directions of the kiln, taken through the walls and firmly screwed up to cast iron wall plates; the tiles should be jointed with red lead putty. Under the floor and above the furnace is the lantern or disperser, which is required to prevent the full force of the fire striking upon one part of the floor, and to equalize the heat. It consists of two courses of flat roofing tiles laid upon wrought-iron bars, 2 ins. by $\frac{3}{4}$ in., laid 9 ins. apart from centre to centre, and partly hung up to the kiln floor and partly supported by upright iron stanchions resting upon the walls of the furnace. In maltings, where kilns are provided for making special descriptions of malt, it is recommended that the kiln plates or tiles should be from the ground: for white malt, 17 ft.; for pale malt, 16 ft.; for amber malt, 14 ft.; for brown malt, 10 ft. But by regulating the strength of the fires almost any description of malt may be made in a good kiln if the maltster be skilful. The roof of the kiln is now generally framed with open timber-work of very steep pitch, covered with slates; and at top, instead of a revolving cowl, it has a ventilator to allow the steam to escape; the roof of the ventilator being taken so far on



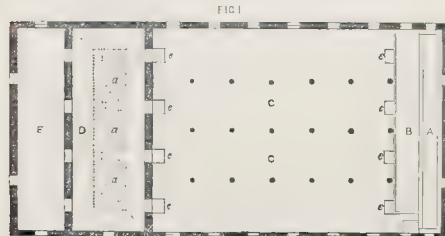
WORKING FLOORS.



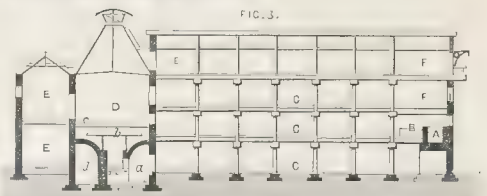
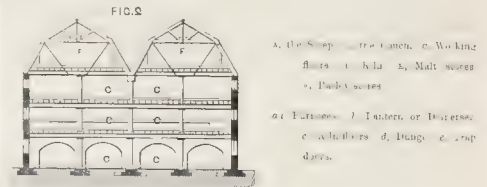
each side as to prevent any driving rain from falling upon the malt lying upon the floor. In some parts of the country revolving cowl

are, however, still in favour. The best arrangement for the furnaces is to divide the kiln below the floor into separate chambers, and to place in each a cast-iron furnace frame provided with slitting-iron bars. Above each furnace there must be a separate lantern, and each one can be worked independently of another. Figs. 4 and 5 exhibit an example of such a kiln.

After the malt is dried, it is taken out, screened, and removed to the malt store until required. It was formerly considered necessary to board the sides of the barley and malt stores to prevent the grain from becoming damp by contact with the brickwork; but it is now found that if the walls have a damp-proof course and are built hollow, no boarding is required, and there is not any harbour for vermin.



Figs. 1, 2, and 3 show the arrangement of a malt-house; in this example a chamber is formed in the roof, part of which is available for a working-floor and the remainder for barley and malt stores, but the upper working-floor is more usually simply roofed over.



The capacities of the barley and malt stores must be regulated by circumstances; sometimes only a small store of each is required, as the maltster may have other granaries and may be disposing of his malt at short intervals; in other cases, should the ground admit of it, it may be desirable to take advantage of this accommodation, and provide large erections allowing of the storing of great quantities of grain when favourable purchases can be made; this must, of course, be a question for the decision of the proprietor.

For the stowage of grain and strength of floors, it may be noticed that 4 bushels = 1 coomb, 2 coombs = 1 quarter. A bushel is 1.28 cubic feet, and a bushel of good barley weighs about 56 lbs. If the imperial bushel weighs 56 lbs. a cubic foot will weigh about 72 lbs. The average weight of barley as checked in some large granaries during many years, was found to be 50 lbs. per bushel.

A. W. M.

MALVAGNA. A village six miles from Randazzo in Sicily. GREEK CHURCH.

MALVERNE (ALDUIN DE), was temp. Henry I (1100-35) surveyor of the works of a bridge over the river Wye at Hereford; *LELAND, Itinerary*, viii, 58.

19. MAMMIDA, now called Firouzabad, situated near the source of the Bagiadass, in the province of Fars in Persia, possesses a vaulted rectangular building, having its front, where the vault of the entrance has fallen, to the north; and occupying a site about 328 ft. long by 180 ft. wide: this palace of the Sassanide sovereigns, is dated about 450 A.D. by FERGUSON, *Illustrated Handbook*, 8vo., London, 1855, p. 373, copying from the detail contained in FLANDIN and COSTE, *Perse Moderne*, fol., Paris, 1844, pl. 97, pp. 344-8, 376-7; they give a very confused account and indistinct drawing of a structure, which as they notice, is called atech-gâh or fire-altar by the natives, although a mass of brickwork, which the above authors consider and illustrate as the real altar of the ancient worshippers, stands in the immediate vicinity.

MAN, POWER OF, or human labour. The greatest amount of effective work which a labourer will perform under the different modes in which he exerts his muscular power. A useful table, chiefly taken from MORIN, *Mécanique Pratique*, 5th edit., 8vo., Paris, 1864, is given in TATE, *Exercises on Mechanics*, 2nd edit., 8vo., London, 1847, p. 9: also OVERMAN, *Mechanics*, 8vo., Philadelphia, 1861, p. 289. GREGORY, *Mechanics for Practical Men*, 4th edit., 8vo., London, 1862, p. 349-60, sect. iv, treats largely on *animal strength*; and relates the experiments by SCHULZE, in the *Mémoires*, Acad. Science

of Berlin for 1783. TELFORD, *Memorandum Book*, printed in WEALE, *Engineer's, etc., Pocket Book* for 1861, p. 29, notes $5\frac{1}{2}$ men as equal to one horse power. EMERSON states that men, such as porters, used to bear loads, can carry from 150 lbs. to 200 lbs. or 250 lbs., according to their strength.

A sack of coals weighs 224 lbs.; a sack of corn 240 lbs.; and a sack of flour 280 lbs. A man will trip along with one of the above on his back and deposit it for ten hours per day; that is, he carries 280 lbs. for five hours.

G. A.

A man cannot well draw more than 70 or 80 lbs. horizontally; he cannot thrust with a greater force acting horizontally at the height of his shoulders than 27 or 30 lbs. Under 14° latitude, a man can only perform half the work he can do in France. Man's power in raising bricks is recorded in the CIVIL ENGINEER, etc., *Journal*, 1843, vi, 302; and the *Papers of the Corps of Royal Engineers*, ser. 1, 1846, x, 154, relate how thirty-six men at Hongkong carried with ease, granite columns each weighing $38\frac{1}{2}$ cwt. for a distance of about half a mile.

GWILT, *Encyc.*, 1867, p. 1317, gives the following weight of man.

| | | |
|---------------------------|-------------|---|
| Mean weight of a Belgian, | 140-49 lbs. | mean height, 5 ft. 6 $\frac{1}{2}$ ins. |
| " " " Frenchman, | 136-69 " | " " " 5 ft. 4 " |
| " " " Englishman, | 150-98 " | " " " 5 ft. 9 $\frac{1}{2}$ " |

The weight in travelling carriages is usually taken at 165 lbs.

Supposing, therefore, each person in standing to occupy 2.5 superficial feet (though 1.5 is the actual average of persons crowded together), which would be close to one another, and indeed closer than would be pleasant, on a square of flooring, there would be $\frac{1000}{2.5} = 400$ persons; and $40 \times 150 \cdot 98 \text{ lbs.} = 2.96$ tons. It is considered, however, that the average weight of an Englishman might more fairly be taken at about 10 stone: and the mean height at about 5 ft. 6 ins. or 5 ft. 7 ins. FLOOR (LOAD ON A). LOAD.

MANAYCABO. A furniture wood of moderate size, hard, as good as mahogany, and in appearance between that wood and Tulip wood. WEALE, *Dict.*

MANCHESTER. An important manufacturing city (so gazetted 16 April 1853) situated in Lancashire, in England. Besides the former township of Manchester, it includes those of Hulme, Chorlton, Ardwick, Cheetham, etc., and the following description will notice the extensive borough of Salford on the other side of the river Irwell, which is crossed by eight bridges of no great importance. In 1644 the town consisted of ten streets and Salford of three; while the old bridge, built 1365 (rebuilt 1838-9 of one arch, and called Victoria bridge) was the only means of communication between them: in 1847 by the Act of Parliament 10 and 11 Victoria c. 108, gazetted 31 Aug., it became the see of a bishop. A timber house is given in the *Illustrations*, 1863-65: a few of the modern residences are noticed in C. E., 1846, ix, 3. The magnitude of the water works is stated to be greater than that of the Croton aqueduct at New York; they were constructed 1847-58 under the superintendence of J. F. Bateman, C.E., at a cost of about £1,200,000; the service reservoir placed 150 ft. above Piccadilly, supplies thirty millions of gallons daily. A short general description of the works and a more minute account of the machinery employed in various parts, is given in the *Transactions of the Institution of Mechanical Engineers*, for 1866. These and the gas works are under the control of the town council. In 1845-6 three public parks were established by subscription at a cost of £36,540; I. L. N., 1846, ix, 13, 144; B. xvii, 793: the botanic garden, 16 acres, has a conservatory of glass and iron designed by T. Worthington. Among the many public statues, the most important is the Albert memorial, 1862-67, designed by T. Worthington, which cost £6,250, with its statue by M. Noble; B. xx, 804-5.

The former parish church having been pulled down, its timber work is considered to have been put up, and still to be seen at Ordsal and at Stand, as narrated by ASHPITEL. The parish and collegiate church, now the cathedral, is dedicated to the

ARCH. PUB. SOC.

Virgin Mary, S. Denis of France, and S. George of England. The tower, 27 ft. square, of late date, had a deeply recessed doorway cir. 1330 on its west side, closed up, which was formerly the chief entrance into the old church; it has been rebuilt since 1858; the lady chapel at the east end 16 ft. square dates cir. 1330. The first stone of the collegiate church was laid July 1422 by Thomas de la Warre, when the choir and St. James's chantry, formerly the north transept, were erected; about 1490 the nave was built; about 1500 the chapel of S. John the Baptist or Derby chapel, 80 ft. long and 26 ft. wide; and the chapter house 22 ft. by 13 ft. 6 ins., which has been rebuilt 1848; 1506 Jesus chapel on the south side, 35 ft. long by 25 ft. wide; 1506 Trafford chapel, 27 ft. by 21 ft. 6 ins.; 1508 S. George's chapel, 25 ft. by 27 ft. 6 ins.; and the Strangeway's chapel, 68 ft. by 22 ft.; 1518 the Oldham chapel, 15 ft. by 12 ft.; and 1520 the Bibby porch, 13 ft. square. The choir is 81 ft. long and 25 ft. 6 ins. wide, or 57 ft. 6 ins. with the aisles; it has a crypt under it: the nave is 88 ft. long 29 ft. wide, or 110 ft. wide including the aisles and chapels; the building is inside 215 ft. long by 112 ft. wide, and will accommodate 3000 persons. The woodwork of the stalls and carvings in the roofs deserve attention. The red sandstone from the Collyhurst quarries with which it was built having become much decayed, the south side and chancel have been almost entirely refaced 1852-57 with a white freestone from the Horwich quarries near Bolton; these and the other works of restoration, including the plastering of the interior, were superintended by J. P. Holden; and the cost up to 31 May 1869 is said to have been £30,000; B. N., 1870, p. 142. The font of Caen stone 1847 with its cover, was designed by George Truefitt of London. HIBBERT, *Ancient Parish Church*, 4to., Manch., 1848: WALCOTT, *Memorials, Archaeological*, etc., London, 1865; and *Cathedrals*, 2nd edit., 8vo., London, 1860: KING, *Handbook to Northern Cathedrals*, 8vo. (Murray), London, 1868: WINKLE, *Cathedrals*, 8vo., Lond., 1836: ASHPITEL, in *British Archaeological Association Journal* 1850, vi: interior and exterior views in I. L. N., 1848, xii, 50: *Builder Journal*, viii, 397-9; xvi, 730; 1860, xviii, 254.

The churches of the various religious denominations are very numerous: those deserving special notice for size or architecture are; in Manchester, S. Anne built 1709-12: S. Mary 1753-6: S. Peter 1788-94, by James Wyatt; the tower 1824, by F. Goodwin; the whole was redecorated 1860, by E. Salomons; these are of Italian architecture: S. John (late Gothic) 1768-9: All Saints, Grosvenor Square, 1819-20, for 1800 persons at a cost of £16,000, the body was burnt 6 Feb. 1850, I. L. N., xvi, 109: and S. Matthew (modern Gothic) 1822-5, by C. Barry, for 1838 persons. In Salford, Trinity built 1635, for 800 persons, but rebuilt 1752: the tower is Gothic: S. Philip (Grecian) 1825, by Sir R. Smirke, for 1828 persons at a cost of £14,000: and S. Simon (Early English) 1845-9, by R. Lane for 850 persons. In Hulme, that of S. George (perpendicular) one of the best, 1826-8, by F. Goodwin, for 2000 persons at a cost of £20,000: Trinity (Early English) 1841-3, by G. G. Scott and Moffatt; C. E., vi, 286: S. Mary and S. John (early geometrical) 1856-8, by J. S. Crowther for the late W. Egerton, Esq., of Tatton Park; its spire is 224 ft. high, B. xvi, 796: and S. Philip, 1859-60, by Shellard and Brown for 670 persons, at a cost of £7000, B. xviii, 548. In Cheetham, S. Luke, (perpendicular) 1836-9, by T. W. Atkinson for 1500 persons, having a tower and spire 170 ft. high, C. E., iv, 78. In Ancoats, S. Andrew, 1831, at a cost of £14,000. In Higher Broughton, S. John the Evangelist, 1836-8, by R. Lane, for 1000 persons at a cost of £9000; the chancel, 1846, by J. E. Grogan, with the windows and reredos by A. W. Pugin, cost over £2000: and S. Barnabas, Oldham-road, 1842-4, by R. Tattersall, for 1000 persons, cost £5000.

Among the Roman Catholic churches is the cathedral of S. John in Salford, opened 1848 (decorated English), by Hadfield and Weightman of Sheffield, having a central tower and spire 240 ft. high, copied from that at Newark, the chancel from

Selby, and the body from Howden, in Yorkshire; it is 200 ft. long by 49 ft. wide, the transepts 130 ft. long by 13 ft. 6 ins. wide; *ECCESTOLOGIST Journal*, 1848, ix, 161-3. The same firm designed S. Chad's church, Cheetham Hill Road (perpendicular), 1846-7; and S. Marie's: S. Wilfred's 1841-2, by A. W. Pugin, is 130 ft. long by 65 ft. wide, for 1100 persons, and cost £5000; *DUBLIN REVIEW Journal, Ecclesiastical Architecture*, 1842: and the church of the Jesuits is now (1870) erecting by J. Hansom. Of other religious denominations are, —the Cavendish-street Congregational chapel (Early English) 1847-9, by E. Walters, for 1500 persons, cost £10,600 with £6000 for the land; the tower and spire are 171 ft. high: I. L. N., x, 181; ARCHITECT, 1849, i, 339; the schools in the rear 1848 cost about £4700; B. vii, 103: Higher Broughton chapel 1856-7 by T. Oliver, Junr., of Sunderland; B. xiv, 671: Union chapel, Oxford-road 1868-9 by Medland and Taylor, at a cost of £16,000: Presbyterian Trinity church and schools, 1845 by Travis and Mangnall; who also designed that in Salford 1847 for 800 persons, with a lofty tower and spire: Grosvenor-square church 1850, by Starkey and Cuffley, with its schools, cost over £14,000: and Brunswick-street church and schools 1857, by Clegg and Knowles: Unitarian chapel, Brook-street, (perpendicular) 1837-9, by C. Barry, for 450 persons, cost about £8500: the Meeting House of the Society of Friends 1828, considered to be the largest in England, for 1200 persons, cost £8500: the Synagogue (Saracenic-Byzantine) 1857-8, by E. Salomons, for 550 persons; another nearly opposite, 1857-8 (Italian) is by T. Bird, B. xv, 266: the Jews' schools 1851 by J. E. Grogan: the Greek church (Corinthian) 1860-1, by Clegg and Knowles, cost £5500, B. xviii, 317.

The town hall (Grecian) 1822-5 was designed by F. Goodwin of London, the building is 136 ft. long by 76 ft. deep, and cost over £40,000; Goodwin, *Domestic Architecture*, 4to., London, 1835; I. L. N., 1843, iii, 261. The new town hall, now in course of erection (Gothic) 1869, designed by A. Waterhouse, is illustrated and described in B. xxvi, 318; and B. N., xv, 314, et seq.: designs by two of the competitors are given in B. xxvi, 336, 392. Hulme town hall (Italian) 1865 is by — Lynde, city surveyor; Cheetham town hall 1854-5 is by T. Bird; C. E., xviii, 105. The royal exchange, designed 1806-8 by T. Harrison of Chester, was rebuilt on a larger scale 1845-56 by A. W. Mills at a cost of £120,900; exterior view in I. L. N., 1849, xiv, 328: in 1865 it was determined to erect a larger building partly on the same site at an estimated total cost of £200,000, and a design 1869 by Mills and Murgatroyd is now in course of erection: a design by A. Waterhouse for another site is given in B. N., 1865, xii, 788. The corn exchange 1837 by R. Lane cost £3250. The stock exchange room, 66 ft. long and 46 ft. 6 ins. wide, by Walters, Barker, and Ellis, accommodates 120 members. The free trade hall 1855-6, by E. Walters, cost £25,000 without fittings, and a total of upwards of £40,000; the frontage is 160 ft. with a height of 70 ft.; the great hall affords space with its gallery for 4600 persons seated; the assembly room is 75 ft. long by 37 ft. 6 ins. wide and 28 ft. high, seating 600 persons; the drawing room adjoining is 40 ft. 6 ins. by 24 ft. and 24 ft. high; B., 1854, xii, 21; xiv, 526-7; its acoustical properties, xviii, 835; I. L. N., 1856, xxix, 374. The new assize courts 1859-65 by A. Waterhouse, the chief block is 270 ft. long by 170 ft. in depth, of three stories about 60 ft. in height; the central tower is over 200 ft. high; the cost, first limited to £70,000, did not exceed £100,000: the competition 1859 is noticed B. xvii; B. N., v; and vi, 505: the plan in B. xvii, 296, 329; xx, 264; xxiii, 136-7; described B. N., xii, 440-2: the Royal Institute of British Architects, *Sessional Papers*, 1859-60, p. 121, gives a description by its architect. A plan for the Borough gaol, Hyde Road, was prepared 1845 by G. Elliott of London (C. E., viii, 292), but it was erected 1847-9 by George Shorland, town surveyor, for 486 persons; it occupies an area of 10 acres, and cost about £120,000, B. vii, 454; it

was enlarged 1856. New Bailey prison, Salford, 1790, on Howard's plan, was increased to hold upwards of 478 persons, when it covered nearly six acres; Dixon, *London Prisons*, etc., 12mo., London, 1850: it is now abandoned, and a new prison by A. Waterhouse adjacent to the assize courts substituted. The workhouse at Crumpsall 1855, for nearly 2000 persons, cost about £50,000, the area inclosed is about 600 ft. by 410 ft. B. xiii, 441. The city, police, and sessions court 1868 are by T. Worthington, B. xxvi, 528; who also designed the Mayfield baths and washhouses 1857-8, costing about £10,000; with those in Hulme 1860 costing nearly £12,000; B. xvi, 554-7; xviii, 414. The Manchester and Salford bank, Mosley-street 1860-2 is by E. Walters, B. xviii, 109; B. N., ix, 218. The branch bank of England 1845-6 by C. R. Cockrell, R.A., cost about £17,500, I. L. N., x, 157. Sir Benjamin Heywood's bank 1848 (Venetian Italian) is by J. E. Grogan, B. vii, 18. Cunliffe Brooks' bank 1868 is by G. Truefitt. The Royal insurance office 1862 is by A. Waterhouse, B. N., ix, 106. The Lancashire insurance office 1866 is by T. Turner of Belfast, B. N., xiii, 430.

Of the nine markets the chief one, called Smithfield, covers an area of nearly four acres; the iron roof in four spans 440 ft. by 244 ft., is by F. R. Wheeldon, C.E., of Derby; C. E., 1854, xvii, 88; B. xi, 578. The market hall 1859 is by Holden and Son; B. xvii, 17. There are three public cemeteries, and a private one. The granaries are noticed in B. 1849, vii, 190.

Chetham's hospital, founded 1653-65, occupies the buildings of the college founded 9 Henry V, 1422, which remain in nearly a perfect state (TURNER and PARKER, *Domestic Arch.* 8vo., Oxford, 1859, iii, 214); it was recased in stone about 1850; B. viii, 425. The free grammar school was founded 1525. Owen's college was opened 12 March 1851; four acres of land have been taken for a new building, designed 1870 by A. Waterhouse, to cost about £40,000. The Lancashire Independent college 1840-43 is by Irwin and Chester, who obtained the premium of 100 guineas, the building cost £14,000, or a total cost of £25,000 for about fifty students, I. L. N., 1843, ii, 295. Henshaw's blind asylum 1836-7 is by R. Lane, with a chapel. The mechanics' institution 1856-7 by J. E. Grogan, continued by W. R. Corson, cost £14,000, contains a library of 20,000 volumes, theatre, &c. The commercial schools 1845 are by Messrs. Holden. The Memorial hall, or Unitarian college, 1865 is by T. Worthington; B. xxiii, 375-7. The infant school for deaf and dumb 1859 by J. Redford, cost £4719; B. xviii, 719. The moral and industrial training school at Swinton 1845 by Tattersall and Dickson, 460 ft. frontage, cost about £40,000. The Royal infirmary and dispensary, founded 1752; the building, forming three sides of a quadrangle, has been enlarged 1848-51-53 by R. Lane, costing about £50,000; the dome 1853 is 30 ft. diameter. The Royal lunatic asylum at Stockport Etchells 1848 by R. Lane, 350 ft. frontage, cost about £10,000; B. vii, 598. St. Mary's hospital 1856 is by W. G. Pennington. The warehousemen's and clerks' orphan schools 1868 are by E. Bates of London, B. N., xv, 94. The Poor Clare's convent 1868, by W. Nicholson, contains thirty-three cells, a school for one hundred and fifty children, and a chapel for two hundred and fifty persons.

The library at Chetham's hospital, the former dormitory of the college, contains about 21,000 volumes, including 130 MSS. The free library, the first in England established under the Acts of 1850 and 1855, is in the former hall of science, I. L. N., 1851, xix, 517; B. x, 579: there are four others, B. xviii, 283. The free museum, library, and reading room 1850-6 in Peel Park, is by Travis and Mangnall; *DUBLIN BUILDER Journal*, 1859, i, 129. The Athenæum 1838 by C. Barry, cost £18,000, the library contains 16,000 volumes; SURVEYOR, ARCHITECT, &c., *Journal*, 1843, iv, 25. The Royal institution 1823 by C. Barry, cost £30,000, including land; the school of art occupies the south wing. The union club established 1825, has had the interior richly decorated, 1850, B. viii, 32. The

reform club 1870 is now erecting by E. Salomons and J. P. Jones, B. N., xviii, 210. The Art Treasures exhibition 1857 was erected by C. D. Young and Co., of Edinburgh and London, under the superintendence of W. Dredge, C.E.; E. Salomons was architect to the Executive Committee; it was 704 ft. long by 200 ft. wide, cost between £40,000 and £50,000, and was pulled down; I. L. N., 1856, xxix, 183: four plates and the specification are in C. E., xx, 313, 349; B. xiv, 447; xv, 264. The theatre royal 1845 by Irwin and Chester, holds 2000 persons and 2500 when full, B. iii, 498: and the Prince's theatre 1864 is by E. Salomons, B. N., xi, 755. The concert hall 1830 by Hayley and Brown, holds 1200 persons. The new assembly rooms 1858-9 are by Mills and Murgatroyd, B. xvii, 75, 843.

Dimensions of the public halls and rooms; CORNISH, *Guide*, 8vo., 1869, p. 57; and the *Manchester Courier*, as given in *Builder Journal*, 1856, xiv, 12; and other sources.

| Names. | 1850 | 1851 | 1852 | 1853 | 1854 | 1855 | 1856 | 1857 | 1858 | 1859 | 1860 | 1861 | 1862 | 1863 | 1864 | 1865 | 1866 | 1867 | 1868 | 1869 | 1870 | 1871 | 1872 | 1873 | 1874 | 1875 | 1876 | 1877 | 1878 | 1879 | 1880 | 1881 | 1882 | 1883 | 1884 | 1885 | 1886 | 1887 | 1888 | 1889 | 1890 | 1891 | 1892 | 1893 | 1894 | 1895 | 1896 | 1897 | 1898 | 1899 | 1900 | 1901 | 1902 | 1903 | 1904 | 1905 | 1906 | 1907 | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 | 2130 | 2131 | 2132 | 2133 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 | 2140 | 2141 | 2142 | 2143 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 | 2150 | 2151 | 2152 | 2153 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 | 2160 | 2161 | 2162 | 2163 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 | 2170 | 2171 | 2172 | 2173 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 | 2180 | 2181 | 2182 | 2183 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 | 2190 | 2191 | 2192 | 2193 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 | 2200 | 2201 | 2202 | 2203 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 | 2210 | 2211 | 2212 | 2213 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 | 2220 | 2221 | 2222 | 2223 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 | 2230 | 2231 | 2232 | 2233 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 | 2240 | 2241 | 2242 | 2243 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 | 2250 | 2251 | 2252 | 2253 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 | 2260 | 2261 | 2262 | 2263 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 | 2270 | 2271 | 2272 | 2273 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 | 2280 | 2281 | 2282 | 2283 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 | 2290 | 2291 | 2292 | 2293 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 | 2300 | 2301 | 2302 | 2303 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 | 2310 | 2311 | 2312 | 2313 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 | 2320 | 2321 | 2322 | 2323 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 | 2330 | 2331 | 2332 | 2333 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 | 2340 | 2341 | 2342 | 2343 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 | 2350 | 2351 | 2352 | 2353 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 | 2360 | 2361 | 2362 | 2363 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 | 2370 | 2371 | 2372 | 2373 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 | 2380 | 2381 | 2382 | 2383 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 | 2390 | 2391 | 2392 | 2393 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 | 2400 | 2401 | 2402 | 2403 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 | 2410 | 2411 | 2412 | 2413 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 | 2420 | 2421 | 2422 | 2423 | 2424 | 2425 | 2426 | 2427 | 2428 | 2429 | 2430 | 2431 | 2432 | 2433 | 2434 | 2435 | 2436 | 2437 | 2438 | 2439 | 2440 | 2441 | 2442 | 2443 | 2444 | 2445 | 2446 | 2447 | 2448 | 2449 | 2450 | 2451 | 2452 | 2453 | 2454 | 2455 | 2456 | 2457 | 2458 | 2459 | 2460 | 2461 | 2462 | 2463 | 2464 | 2465 | 2466 | 2467 | 2468 | 2469 | 2470 | 2471 | 2472 | 2473 | 2474 | 2475 | 2476 | 2477 | 2478 | 2479 | 2480 | 2481 | 2482 | 2483 | 2484 | 2485 | 2486 | 2487 | 2488 | 2489 | 2490 | 2491 | 2492 | 2493 | 2494 | 2495 | 2496 | 2497 | 2498 | 2499 | 2500 | 2501 | 2502 | 2503 | 2504 | 2505 | 2506 | 2507 | 2508 | 2509 | 2510 | 2511 | 2512 | 2513 | 2514 | 2515 | 2516 | 2517 | 2518 | 2519 | 2520 | 2521 | 2522 | 2523 | 2524 | 2525 | 2526 | 2527 | 2528 | 2529 | 2530 | 2531 | 2532 | 2533 | 2534 | 2535 | 2536 | 2537 | 2538 | 2539 | 2540 | 2541 | 2542 | 2543 | 2544 | 2545 | 2546 | 2547 | 2548 | 2549 | 2550 | 2551 | 2552 | 2553 | 2554 | 2555 | 2556 | 2557 | 2558 | 2559 | 2560 | 2561 | 2562 | 2563 | 2564 | 2565 | 2566 | 2567 | 2568 | 2569 | 2570 | 2571 | 2572 | 2573 | 2574 | 2575 | 2576 | 2577 | 2578 | 2579 | 2580 | 2581 | 2582 | 2583 | 2584 | 2585 | 2586 | 2587 | 2588 | 2589 | 2590 | 2591 | 2592 | 2593 | 2594 | 2595 | 2596 | 2597 | 2598 | 2599 | 2600 | 2601 | 2602 | 2603 | 2604 | 2605 | 2606 | 2607 | 2608 | 2609 | 2610 | 2611 | 2612 | 2613 | 2614 | 2615 | 2616 | 2617 | 2618 | 2619 | 2620 | 2621 | 2622 | 2623 | 2624 | 2625 | 2626 | 2627 | 2628 | 2629 | 2630 | 2631 | 2632 | 2633 | 2634 | 2635 | 2636 | 2637 | 2638 | 2639 | 2640 | 2641 | 2642 | 2643 | 2644 | 2645 | 2646 | 2647 | 2648 | 2649 | 2650 | 2651 | 2652 | 2653 | 2654 | 2655 | 2656 | 2657 | 2658 | 2659 | 2660 | 2661 | 2662 | 2663 | 2664 | 2665 | 2666 | 2667 | 2668 | 2669 | 2670 | 2671 | 2672 | 2673 | 2674 | 2675 | 2676 | 2677 | 2678 | 2679 | 2680 | 2681 | 2682 | 2683 | 2684 | 2685 | 2686 | 2687 | 2688 | 2689 | 2690 | 2691 | 2692 | 2693 | 2694 | 2695 | 2696 | 2697 | 2698 | 2699 | 2700 | 2701 | 2702 | 2703 | 2704 | 2705 | 2706 | 2707 | 2708 | 2709 | 2710 | 2711 | 2712 | 2713 | 2714 | 2715 | 2716 | 2717 | 2718 | 2719 | 2720 | 2721 | 2722 | 2723 | 2724 | 2725 | 2726 | 2727 | 2728 | 2729 | 2730 | 2731 | 2732 | 2733 | 2734 | 2735 | 2736 | 2737 | 2738 | 2739 | 2740 | 2741 | 2742 | 2743 | 2744 | 2745 | 2746 | 2747 | 2748 | 2749 | 2750 | 2751 | 2752 | 2753 | 2754 | 2755 | 2756 | 2757 | 2758 | 2759 | 2760 | 2761 | 2762 | 2763 | 2764 | 2765 | 2766 | 2767 | 2768 | 2769 | 2770 | 2771 | 2772 | 2773 | 2774 | 2775 | 2776 | 2777 | 2778 | 2779 | 2780 | 2781 | 2782 | 2783 | 2784 | 2785 | 2786 | 2787 | 2788 | 2789 | 2790 | 2791 | 2792 | 2793 | 2794 | 2795 | 2796 | 2797 | 2798 | 2799 | 2800 | 2801 | 2802 | 2803 | 2804 | 2805 | 2806 | 2807 | 2808 | 2809 | 2810 | 2811 | 2812 | 2813 | 2814 | 2815 | 2816 | 2817 | 2818 | 2819 | 2820 | 2821 | 2822 | 2823 | 2824 | 2825 | 2826 | 2827 | 2828 | 2829 | 2830 | 2831 | 2832 | 2833 | 2834 | 2835 | 2836 | 2837 | 2838 | 2839 | 2840 | 2841 | 2842 | 2843 | 2844 | 2845 | 2846 | 2847 | 2848 | 2849 | 2850 | 2851 | 2852 | 2853 | 2854 | 2855 | 2856 | 2857 | 2858 | 2859 | 2860 | 2861 | 2862 | 2863 | 2864 | 2865 | 2866 | 2867 | 2868 | 2869 | 2870 | 2871 | 2872 | 2873 | 2874 | 2875 | 2876 | 2877 | 2878 | 2879 | 2880 | 2881 | 2882 | 2883 | 2884 | 2885 | 2886 | 2887 | 2888 | 2889 | 2890 | 2891 | 2892 | 2893 | 2894 | 2895 | 2896 | 2897 | 2898 | 2899 | 2900 | 2901 | 2902 | 2903 | 2904 | 2905 | 2906 | 2907 | 2908 | 2909 | 2910 | 2911 | 2912 | 2913 | 2914 | 2915 | 2916 | 2917 | 2918 | 2919 | 2920 | 2921 | 2922 | 2923 | 2924 | 2925 | 2926 | 2927 | 2928 | 2929 | 2930 | 2931 | 2932 | 2933 | 2934 | 2935 | 2936 | 2937 | 2938 | 2939 | 2940 | 2941 | 2942 | 2943 | 2944 | 2945 | 2946 | 2947 | 2948 | 2949 | 2950 | 2951 | 2952 | 2953 | 2954 | 2955 | 2956 | 2957 | 2958 | 2959 | 2960 | 2961 | 2962 | 2963 | 2964 | 2965 | 2966 | 2967 | 2968 | 2969 | 2970 | 2971 | 2972 | 2973 | 2974 | 2975 | 2976 | 2977 | 2978 | 2979 | 2980 | 2981 | 2982 | 2983 | 2984 | 2985 | 2986 | 2987 | 2988 | 2989 | 2990 | 2991 | 2992 | 2993 | 2994 | 2995 | 2996 | 2997 | 2998 | 2999 | 3000 | 3001 | 3002 | 3003 | 3004 | 3005 | 3006 | 3007 | 3008 | 3009 | 3010 | 3011 | 3012 | 3013 | 3014 | 3015 | 3016 | 3017 | 3018 | 3019 | 3020 | 3021 | 3022 | 3023 | 3024 | 3025 | 3026 | 3027 | 3028 | 3029 | 3030 | 3031 | 3032 | 3033 | 3034 | 3035 | 3036 | 3037 | 3038 | 3039 | 3040 | 3041 | 3042 | 3043 | 3044 | 3045 | 3046 | 3047 | 3048 | 3049 | 3050 | 3051 | 3052 | 3053 | 3054 | 3055 | 3056 | 3057 | 3058 | 3059 | 3060 | 3061 | 3062 | 3063 | 3064 | 3065 | 3066 | 3067 | 3068 | 3069 | 3070 | 3071 | 3072 | 3073 | 3074 | 3075 | 3076 | 3077 | 3078 | 3079 | 3080 | 3081 | 3082 | 3083 | 3084 | 3085 | 3086 | 3087 | 3088 | 3089 | 3090 | 3091 | 3092 | 3093 | 3094 | 3095 | 3096 | 3097 | 3098 | 3099 | 3100 | 3101 | 3102 | 3103 | 3104 | 3105 | 3106 | 3107 | 3108 | 3109 | 3110 | 3111 | 3112 | 3113 | 3114 | 3115 | 3116 | 3117 | 3118 | 3119 | 3120 | 3121 | 3122 | 3123 | 3124 | 3125 | 3126 | 3127 | 3128 | 3129 | 3130 | 3131 | 3132 | 3133 | 3134 | 3135 | 3136 | 3137 | 3138 | 3139 | 3140 | 3141 | 3142 | 3143 | 3144 | 3145 | 3146 | 3147 | 3148 | 3149 | 3150 | 3151 | 3152 | 3153 | 3154 | 3155 | 3156 | 3157 | 3158 | 3159 | 3160 | 3161 | 3162 | 3163 | 3164 | 3165 | 3166 | 3167 | 3168 | 3169 | 3170 | 3171 | 3172 | 3173 | 3174 | 3175 | 3176 | 3177 | 3178 | 3179 | 3180 | 3181 | 3182 | 3183 | 3184 | 3185 | 3186 | 3187 | 3188 | 3189 | 3190 | 3191 | 3192 | 3193 | 3194 | 3195 | 3196 | 3197 | 3198 | 3199 | 3200 | 3201 | 3202 | 3203 | 3204 | 3205 | 3206 | 3207 | 3208 | 3209 | 3210 | 3211 | 3212 | 3213 | 3214 | 3215 | 3216 | 3217 | 3218 | 3219 | 3220 | 3221 | 3222 | 3223 | 3224 |
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competition. Mandar published *l'Architecture des Forteresses ou de l'art de fortifier les places*, part 1 only, 120 illustrations, 8vo., Paris, 1801; and *Etudes d'Architecture Civile*, new edition, fol., Paris, 1826-30, with 120 pl.; and edited the work by VITRY, *Le Propriétaire Architecte*, first printed 1827. From about 1808 he taught civil architecture at the école royale des Ponts et Chaussées, to which body he was appointed architect and engineer-in-chief, honorary professor, inspector-general of civil buildings and of marine constructions, etc. He died in 1830. 110. 112.

MANDELATO MARBLE, found at Luggezzano in Italy; is of a light-red colour, with yellowish-white spots: ANSTED, *Geology*, etc., 1850.

MANDONOPH. An Egyptian scribe specially charged with the erection of the palace of Menephthah I, whose tomb was found by Prisse at El-Assassif, may be presumed to have been an architect; LOCKYER, in Royal Institute of British Architects, *Transactions*, 4to., 1859-60, p. 93.

MANDOW. A ruined town situated in the province of Malwah, in Hindostan. It was formerly the capital of the Dhar rajahs, and subsequently of the Patan sovereigns of Malwah, 1404. The walls are twenty-eight miles in circumference. The most remarkable ruins (all dating perhaps before 1561) are, the palace of Baz Bahauder, on an eminence; the Jehaz-kamahal placed between two immense tanks; the Jumma musjeed, the finest and largest specimen of the Afghan mosque existing in any part of India; the adjoining college; three other mosques; and the mausoleum of Hussein shah, of white marble from the banks of the Nerbudda; the usual material employed is a fine calcareous red sandstone. The style of architecture is principally Afghan, as denoted by the small cupola and other prevailing peculiarities, but of an improved character as compared with the Afghan structures in Upper Hindostan: HAMILTON, *East India Gazetteer*, 8vo., London, 1828.

MANETTI (ANTONIO), lived at Florence, and was one of the four artists who presented, 31 December 1436, designs in competition with Brunellesco for the lantern, erected 1443-56, of the cupola to the duomo. He completed after 1446 the transept of that edifice and the small tribune which was executed, both within and without, in a manner widely deviating from the ideas of Brunellesco. He also continued, differing from that architect's intention (LAPI, p. 23), the church of S. Lorenzo, or basilica Ambrosiana, the first stone of which was laid 1425; GAYE, *Carteggio*, 8vo., Florence, 1839, i, 167-71, 194, 255-62; which, i, 238-9, states he superintended 1451-72, the cappella maggiore in Sta. Maria Annunziata (Servite) under L. B. Alberti, which is usually attributed to L. Fancelli. DEL ROSSO, *Metrop. Fiorentina*, 4to., Florence, 1820, p. 12.

MANETTI (GIUSEPPE), designed 1787 a casino in the Cascine at Florence, given in GRANDJEAN and FAMIN, *Architecture Toscane*, fol., Paris, 1846, pl. 60; and he modernised 1794 the church of the convento dei Padri Cappuccini, detto di Montughi, in the environs of the same city: FANTOZZI, *Guida*, 8vo., Florence, 1842, p. 755-6.

MANFREDI (FRA ANDREA), called also Andrea da Faenza, was elected 1374 general of the Order of the Servites, at Bologna. He added to the chiesa della SS. Annunziata at Florence; designed many large buildings in various monasteries in Bologna and elsewhere; and in that city, 26 February 1390, was deputed to superintend the church of S. Petronio, with A. Vicenzi or Vincenzio; the decree is given in CROGNARA, *Storia*, fol., Venice, 1813-8, ii, 2, 7; note in VASARI, *Vite*, 8vo., Florence, 1846, i, 238. For his order he designed in that city, 1338-92, the church of Sta. Maria Addolorata dei Servi; also its stalls; and 1392 the grand portico built on marble columns to the same building; a brick cornice is given in the *Illustrations*, 1848-9, pl. 17, fig. 4: in this church is a sepulchral tablet recording his death in 1396. 105.

MANFREDONIA. A seaport town near Naples, in the province of Capitanata, in Italy. It was founded 1251 or 1266,

and is walled on all sides, having large round bastions; a castle commands the harbour. The town is built on a regular plan, with wide streets; some of the houses remain unfinished; it was nearly destroyed by the Turks in 1620. It is the see of an archbishop. About a mile south-west is the original Sipontum (which supplied the stone for the new town) said to have been founded by a Greek colony under Diomed: here is situated the former cathedral dedicated to the Virgin, a Gothic edifice of small dimensions with a fine portico, and containing one of the largest bells in Italy, cast cir. 1266. 28. 50.

MANGANESE. A metal of which the black oxide, or binocide was first described by Scheele in 1774. The colour of pure manganese when broken is of a dull white, but so strong is the affinity of the metal for oxygen, that it absorbs this gas from the air, and becomes an oxide, hence it is never found to occur in nature in a metallic state. It is hard and brittle, though not easily reduced to powder. Even at common temperatures it slowly decomposes water. The metal itself combines with chlorine, and is of great use, in this form as bleaching powder, in linen factories. The oxides are employed in glass factories to a very great extent; a larger quantity imparts a purple or amethystine colour; a small quantity renders the glass colourless by correcting the yellow tinge which oxide of iron imparts. It is also used in making the black enamel of pottery. It was added, by Mr. Heath, to cast steel in the crucible, and when drawn out under the tilt hammer it could be worked and welded to iron like shear steel, and is now generally used for cutlery: Institution of Civil Engineers, *Minutes*, 8vo., London, 1843, ii, 85. 14.

It has been noticed that if manganese be added to mortar it imparts the important property of hardening under water. A double salt of manganese and lime, or of manganese and zinc, is applied for preserving wood, and for absorbing the effluvia of putrid matter, by the patentee, A. E. Paschal le Gros; CIVIL ENGINEER, etc., *Journal*, 1855, xviii, 20. Condyl's patent fluids, used largely for disinfectant purposes, are peroxides of manganese. One of the ores of manganese, called black wadd, is remarkable for its spontaneous inflammation when mixed with oil. Manganese is often used surreptitiously as an adulteration in lieu of red lead in the composition of pigments.

MANGANESE BROWN. An oxide of manganese, of a fine, deep, and semi-opaque brown colour, drying well in oil. It is deficient in transparency, but may be useful for glazing or lowering the tone of white without tinging it; and as a local colour in draperies, dead colouring, etc. It has a good body, and is perfectly durable both in water and oil; FIELD, *Painters' Art*, 12mo., London, 1858, p. 93.

MANGEE. The fitting in a stall in which food and water are placed for horses and cattle. Formerly, in a stable it consisted of a trough running the whole width of the stall, only receiving the corn; the hay being placed in a rack over the head of the animal; water being supplied in a pail. Now, the end of the stall is made of cast iron, enamelled or galvanized, and divided into the three compartments, the upper rack being abandoned in improved stables. In a loose box, the three are often placed in one of its corners. Bullock and cart-horse sheds are still supplied with long mangers of wood or stone, or sometimes with only one trough; CATTLE SHED. The bottom of a manger should not be placed lower than 20 inches from the floor.

MANGIFERA INDICA, the mango tree. A timber tree of large growth, plentiful in the south of India. The mature wood is dull, grey, open, yet durable if not exposed to wet, of the effect of which it is very sensitive. It is the cheapest wood procurable in the Madras Presidency; and is used for packing cases, boarding, and rough work in general. Mr. Rohde says it holds a nail faster than any wood known to him; BUILDING NEWS *Journal*, 1856, ii, 919.

MANGIN (CHARLES) was born 1721 at Mitry near Meaux. He executed at Paris many important works, amongst others

the halle au blé; the restoration of the portail of S. Sulpice and the elevation of the towers of that building; several hôtels, and the seminary of S. Esprit. He left a "Recueil de modèles d'Architecture," which has not been published. BIOGRAPHIE CHAMPENOISE. 112.

MANGONE DA FIESOLE, see FIESOLE (M. DA).

MANGONE (FABIO), was employed at Milan, where 1548 he did the five interior doorways of the duomo; and built 1574 the church of S. Sebastiano on the designs of Pellegrini, as stated on the plate shewing the interior in *Raccolta dell'Intorno Chiese*, fol., Milan, 1823. FRANCHETTI, *Storia*, 4to., Milan, 1821, p. 145, gives the date 22 May 1617 as the engagement of a Fabio at Milan cathedral. The centre of the ospedale maggiore was erected 1621 by him and F. Richini who planned the great central quadrangle, and, altering the capitals, availed themselves of an external portico executed by Bramante which is in the right wing. He also designed (about 1618) the *libreria Ambrosiana*, also at Milan. He died 1629. 26.

MAN-HOLE. The name of the opening left in the dome, or the covering stone, of a well or of a cesspool, and through which a man can pass for the purpose of cleaning or repairing it, and has a stone or plate for securing the opening. When the well is somewhat deep and a ladder is needed to be passed down, the opening should not be less than 30 ins. diameter, or 24 ins. square; where the man can conveniently get into it, a smaller size will suffice. Boilers, large and small, have similar openings for like purposes, and are made as small as possible.

MANIIS (ANGELUS DE), seems to be the proper form of a name, which in the *Handbook*, appears as Angelo de Manius, a Sicilian sculptor, otherwise that Angelo Ciciliano (Ceciliano is about nine miles from Tivoli) who is mentioned by VASARI, s.n. *Girolamo*, as commencing the portico of the church of S. Celso in Milan finished or continued after his death by C. Solari: this vestibule was in existence 1520 and was destroyed when the church was reduced to a simple oratory; DE PAGAVE insists that Angelo was the builder originally employed to execute the design 1491 by LAZZARI of the church. The statue of Pius IV (1559-66) in the *duomo*, and the Virgin with four angels formerly on the east front of that building, are his work. 28.

MANILA (Lat. Manilia; Fr. Manille; Engl. Manilla). The capital of the island Luzon, and of all the Philippine Islands; one of the great emporiums of the East. It was founded by Legaspi in 1571; nearly destroyed by an earthquake in 1645; again from 16 Sept. to 12 Oct. 1852, when scarcely a building remained uninjured; and later, 3 June 1863, when "the city was overthrown almost in a moment; the Roman Catholic cathedral, several churches, the palace, several schools, and indeed all the public buildings were razed to the ground, or so shaken that they must be pulled down. All the houses in the Baracca fell, and the Binonda, an ancient structure, was destroyed. The church of S. Augustin was the only one that escaped entirely, and it also withstood the great shock of 1645": other details are given in *BUILDER JOURNAL* 1863, xxi, 610; and *ALL THE YEAR ROUND JOURNAL* 26 September 1863, p. 112. The city is situated on the river Pasig, which is crossed by a bridge. Houses of solid masonry mingle with cottages raised on posts to permit the free passage of water in the rainy season, and so constructed as by their elasticity to stand the shocks of an earthquake: the streets are straight but for the most part unpaved and almost impassable during the rains. In the city the houses are two stories high, each having its central court yard; stables and stores occupy the ground floor, above are the public and sleeping rooms. There are several squares, the Prado, which is the largest, has a bronze statue of Charles IV of Spain. A theatre built of wood is stated to be held together with bamboo pins and rattan fastenings. Fra Antonio de Herrera designed 1599 the monastery and church of the Ermitaños Observantes, which according to GASPAR, *Conquistas de las Philipinas*, fol., Madrid, 1698, formed one of the best ARCH. PUB. SOC.

edifices of the place. MURILLO, *Geografia*; MORG, *Sucesos de las Islas*, 4to., Ant., 1609. The church of Binonda, and the harbour, are shown in VAILLANT, *Voyage autour du Monde*. The Binonda suburb on the north is more populous than the city itself, and is the residence of the foreign merchants; the other many suburbs have each its special character. 50. 66.

MANISSA or MANSER, see MAGNESA AD SIPYLUM.

MANIZIA (AMBROGIO), probably a Milanese, appears in the list of persons employed at the cathedral of Milan under the date 17 December 1391; FRANCHETTI, *Storia*, 4to., Milan, 1821, p. 140. GIULINI, *Memorie*, 4to., Milan, 1760-71, xi, 418.

MANLEY STONE. A strong white grit stone, belonging to the new red sandstone formation, which is procured from a quarry in the village of Manley, eight miles from Chester. There is a siding into the quarry from the West Cheshire railway. The stone can be lifted with wedges from the face of the rock in blocks of any required thickness, because there are no beds in the solid mass about 80 to 100 ft. deep, which underlies a top soil about 7 to 8 ft. deep. The stone is said to endure the exposure of any side to the weather; and to be practically imperishable: there is a house about a mile distant from the quarry with the date 1602, of which the letters and stone are quite perfect. The monolithic columns in front of Chester castle, erected 1793-1820 by T. Harrison, were got 30 ft. long and 4 ft. in diameter, sound and perfect. This stone has been used extensively at Chester castle, at Eaton hall, and at neighbouring mansions and other buildings: also lately in Chester for the new town hall, and in the new market 1862-3. *BUILDER JOURNAL*, xxi, 97. J. D.

MANLIO (FERDINANDO), born about 1500 at Naples, studied under G. Merliano. He assisted F. Maglione and G. Benincasa in the erection 1535 of that third cortile to the palazzo reale at Naples, which was destroyed for the wing executed 1600 by D. Fontana; he also assisted his master in the erection about 1540 of the church of S. Giacomo degli Spagnuoli for don Pedro de Toledo; and of the church of S. Giovanni de' Genovesi. About the same time he designed the chiesa della Nunziata (burnt 1757 and rebuilt by Vanvitelli), besides improving its convent and hospital. For the same don Pedro marques de Villafranca and viceroy 1532-54, he built the fortified palace (used since 1750 as a barracks) at Pozzuoli to induce the inhabitants of that town to return after the formation 29 September 1533 of Monte Nuovo. Returning to Naples he, with Merliano, formed for the same patron along the Angiovine fosses the strada Toledo and the strada de' Tribunali, building the offices of the tribunals: he also executed several fountains. He formed the strada di porta Nolana; restored the strada di Capua; restored the ancient tunnel called the grotta di Pozzuoli by which that town derives its present supply of water; and erected a bridge over the Volturno, which is probably the ponte reale leading into the royal chase at Capriati. The article CAPUA notices the bridge works (if any) there effected by him. In 1559 he formed for don Parasan de Ribera duke of Alcala viceroy 1559-71 the strada Ribera from the porta reale del Gesù afterwards called del Spirito Santo (now destroyed) to the castel nuovo. He was engaged on a project for draining the Campanian marshes, when he died 1570. He had erected, on the death 1553 of his son Timoteo a family monument in the Nunziata. His portrait is given in the *Biografia degli Uomini Illustri del regno di Napoli*, 4to., Naples, 1813-22, vii. D. Lazzari was perhaps his pupil. 28, 30, 95.

MANN AND CO.'S PATENT STUCCO PAINT CEMENT, is the same as that described s.d. JOHN'S CEMENT.

MANNAIONI (G.), designed 1779 the new theatre at Florence; and rebuilt 1782 the church of Sta. Maria del Carmine in the same city, burnt 25 January 1771 except the front and the capella Brancacci; FANTOZZI, *Guida*, 8vo., Florence, 1812.

MANNI (GIOVANNI BATTISTA), designed 1709 the church

called *il divino Amore*, at Naples, upon a model by Francisco Picchiatti: the high altar is the work of Sanfelice. 95.

MANOELINO ESTILO, and Estylo Emmanuelina. The names given by Portuguese archaeologists to the particular style of the buildings erected under king Manoel the Happy, of Portugal, 1495-1521. DA SILVA, *Mémoire descriptive pour l'église de Belem*, 12mo., Lisbon, 1867, p. 3.

MANOPOLA (BARTOLOMEO), called *il Monopola*, is the same as Bartolo d'ALESSANDRO.

MANOR. Godfrey, bishop of Coutances, who had been present at the battle of Hastings, obtained from William I the grant of two hundred and eighty *villas* (quas a manendo, *manerios* vulgo appellamus, ORDERICUS VITALIS), commonly called 'manors' from their having a mansion house upon them. "Here," says MASERES, *Historia Anglicana*, 4to., Lond., 1807, p. 255, "we have the derivation and original meaning of the word *manor*, which now denotes a parcel of land, with or without a house upon it, of which a part remains in the lords' or owners' hands, and is called his demesne land, *terra dominica*, or *terra domini*; and another part has been granted away before the 18th Edward I, 1290, to two or more other persons to hold to them and their heirs for ever, of the grantor, or lord, and his heirs for ever, either by knight's service or in free and common socage. In that year the statute of *Quia emptores terrarum* was passed, which prohibited the making of these under grants of land to be holden of the grantor (which were found to be attended with many inconveniences), and ordained that all lands should afterwards be granted away to be holden in inheritance by the grantee, should be holden of the same upper lord of whom the grantee himself had held them before the new grant. In consequence of this statute, it has been impossible to create a new manor ever since the year 1290. But before that time, any man that was possessed of freehold lands of inheritance might have converted them into a manor whenever he pleased, by granting two or more portions of them to two or more other persons, to be holden to them and their heirs for ever, of him and his heirs for ever, either by the tenure of military service (called in the law books knight services), or in free or common socage."

The Statute "*Extenta manerii*" supposed to be 4 Edward I, will be found in the STATUTES OF THE REALM, fol., London, 1810, i, 242. COPYHOLD.

MANOR HOUSE (Fr. *manoir*). The residence erected on a manor. Many were not built in England so early as the twelfth century, for the land had not been much subdivided. Licences to embattle manor houses, occurring frequently in the reign of Henry III, would indicate the thirteenth century as the period when the mesne tenants of the great barons first began to build substantially on their own account. The early buildings were for the most part small, somewhat square in form, and were built on one uniform plan, comprising a hall (*aula*) with a chamber or chambers adjacent. In the later era, they were built on the same plan, the chambers being sometimes so arranged as to form three sides of a quadrangle, as at Charney in Berkshire, a residence of the Basset family, where the south wing consisted of two habitable stories; the lower floor was ordinarily a cellar; a chapel or oratory adjoined the *solar* or upper chamber. Numerous licences to crenellate manor houses occur in the records of the fourteenth century; in the following century, in the interior of England, the manor house was designed accordingly as the chance of attack weighed with the builder in deciding between civil and military arrangements, although in some cases, other circumstances must have influenced the plan; for in the same district, and within a few miles of each other, are found one house bearing the stamp of the fortress, and another that of the domestic mansion. Besides the peels of Scotland and the border counties, and the towers of Ireland, in the more peaceful districts of England many houses were built also after the fashion of these towers. Tattershall castle, Lincolnshire, is a fine example of this class, built of brick; Middleton Tower, Norfolk, also of brick, is another good one, smaller in

size. In the peaceful districts, the examples at Great Chalfield and South Wraxall, Wiltshire, are merely convenient dwelling houses. S. Donat's on the borders of South Wales, strongly fortified with a moat, gatehouses, and outer and inner bailey, is of a date perhaps later than the above examples, and at the same time perfectly manorial in its character and purposes; TURNER and PARKER, *Domestic Architecture*, 8vo., Oxford, 1851-9, index and woodcuts of examples. KERR, *Gentleman's House*, 2nd edit., 8vo., 1865, p. 18-21. VIOLETT LE DUC, *Dict.*, s. v. *Manoir*, pp. 300-16, carefully defines it as the walled and moated dwelling of a landed proprietor, noble or otherwise, who did not possess seigniorial rights entitling him to a castle with a donjon, high embattled walls, and towers, besides exterior defences.

MANRESA (JUAN AND FRANCISCO), see GRAO DE MANRESA (J. AND F.).

MANRIQUE (ANGEL), born 1577 at Burgos, became general of the Cistercians, and bishop of Badajoz. He designed the celebrated geometrical stairs on a rectangular plan in the college of S. Bernardo at Salamanca; and is here noticed as one of the few prelates whose skill, either in the theory or the practice of building, is indubitable. He died 1649. 66.

MANS, or LE MANS, called Cenomanum in the fourth century, was once the capital of the province of Le Haut Maine, but now the chief town of the département de la Sarthe, in France. It is situated on the left branch of the river Sarthe, which is crossed by three bridges. Excepting the foundations of the walls and towers, the vestiges of the Roman period are now not considerable, the chief remains are three subterranean aqueducts, a portion of which may be seen in a cellar in the rue Gourdain. Some old houses still exist in the rue de l'Hôpital, Nos. 21, 31, 7, 10, and 12, in the narrow Grande rue, the last one is known as the house of queen Berengaria, but it appears not to be older than the fifteenth century. The house called the "Grabatais" near the *place* du Château formed a retreat for sick canons. The houses are chiefly built of stone and covered with slate.

The cathedral dedicated to S. Julien, was entirely rebuilt in the eleventh century, of which date are the west front, the outer walls of the nave aisles, and the lower part of the north transept. There is a richly carved Romanesque doorway on the south side. The nave and transept appear to have been considerably altered in the twelfth century (1134, INKERSLEY, *Inquiry*, 8vo., London, 1850, p. 69), the pointed arches and vaulting having then been erected. About 1200 the choir was rebuilt, this with its eleven chapels covers more ground than the whole of the ancient cathedral, and is considered superior to those of Chartres and Bourges: it was restored in 1858. The gable of the transepts having a fine rose window; and the belfry tower, in the unusual position of the extremity of the south transept, and the *portail*, were not completed until the fourteenth century. The sacristy is of the thirteenth century. The fine stained glass dates in the thirteenth, fourteenth, and fifteenth centuries. Among the several tombs of interest are those of Berengaria of Sicily, queen of Richard I of England, brought 1821 from the abbey of Epau, but defaced; and of Charles of Anjou or de Bourbon, who died 1474, with its chapel (Renaissance). The nave and transepts are 220 ft. long, the former with its aisles is 78 ft. wide; the choir is 149 ft. long by 123 ft. wide without the chapels but including the double aisles, and 108 ft. high; the centre chapel is 51 ft. deep by 18 ft. wide; a plan is given in VIOLETT LE DUC, *Dict.*, s. v. *Cathédrale*, p. 356. KING, *Study Book*, 4to., Lond., 1868, iii, 6 plates. HUCHER, *Calques des Vitraux*, 100 coloured plates, fol. Paris 1864. BOURASSÉ, *Cathédrales de France*, 8vo., Tours, 1843.

The church of S. Pierre has the lower part of its walls very old; that of the Visitation or l'ancienne Visitation is comparatively modern and very handsome; that of N. D. du Pré is probably of the eleventh century; and that of N. D. de Couture (de cultura dei) has a choir supposed to have been begun about

990; the building was injured by restoration 1857; its monastery is now the prefecture, and contains a public library of about 50,000 volumes and 300 MSS., a museum of antiquity, picture-gallery, etc. The protestant "temple évangélique," a plain building, was opened 5 May 1861. The séminaire, formerly the abbaye de S. Vincent, has a good front and staircase. The theatre is built on the site of a suppressed Dominican monastery.

14. 28. 50.

MANSARD properly **MANSART**. An apparently apocryphal list of architects, painters, and sculptors, descending from Michele Mansarto, cavaliero Romano (said to have been employed in the construction about 989 of the cathedral at Noyon) and practising in France till 1525 but in Italy till about 1575, is given in LAMBERT, *Histoire Litt.*, 4to., Paris, 1751, iii, in the pedigree of a Pierre François Mansart of Turin, who is said to have died in Paris, leaving a son, the celebrated François MANSART, and two daughters whose children were the DELISLE-MANSARTS and the HARDOUIN-MANSARTS hereafter mentioned.

MANSARD ROOF. It is extraordinary that QUATREMÈRE DE QUINCY, *Dict.*, s. v. Mansarde, notices this French word as meaning a window in a curb roof, adding that "on nomme toutefois ainsi des lucarnes prises dans les combles, de quelque manière qu'elles soient pratiquées;" and in his account of the life of F. Mansart he speaks of the invention of a window but mentions nothing about a roof. From the rest of his article s. v. *Mansarde*, and from other sources, it appears that the interiors of the usual steep roofs were not liked for apartments because the upright linings occupied too much of the floor, and the celebrated F. Mansart perceived very early the possibility of utilizing such spaces. As may be seen by a comparison of the sections in LE MUEZ, *Manière de bâtir*, 2nd edit., fol., Paris (n. d. but query 1647), pl. 66 and 74-5, Mansart followed the old system of framing for the slope between his floor and ceiling, but made this frame much steeper; and then, abolishing the framing which gave the upper part of the old roofs, he terminated his work by a covering at a very low pitch. Thus was produced the common curb roof (Fr. *comble à la Mansarde, toit brisé*), which SAUVAT, *Histoire*, fol., Paris, 1724, ii, 27, declares had been introduced from Italy and used at the Louvre by Lescot about 1550. Amongst others who contest the merit of Mansart in this subject may be mentioned KRAFFT, *Plans—de la Charpente*, fol., Paris, 1805, pt. i, pl. 6, who gives, pt. ii, pl. 40, a supposed improvement by Stienne: but it has already been shown that the object of Mansart was not a new system of framing but an extended area of available flooring; and in vaulting, a similar extension of the space for bracketing attended his use of the curb roof. It is suggested that the remarkable explanation above given of the term *Mansarde* to a window was meant to mark the epoch of the adoption of roof dormers instead of wall dormers. Sections of the application of the roof are shown in GWILT, *Encyclo.*, edit. 1867, figs. 686-7.

MANSART (FRANÇOIS), born 1598 at Paris, closes LAMBERT's pedigree of the MANSARD family as the son of Pierre François. He was really a son of Absalon (usually called one of the king's carpenters) entitled architect by PERRAULT, *Recueil des hommes illustres*, fol., Paris 1696, p. 87, who gives a portrait of François painted by Namur and engraved by Edelinck. Left early as an orphan, he was educated by a brother-in-law, probably the Michel Hardouin named in the second of the following articles. As the list of Mansart's works given in the *Recueil* does not contain dates, they are here arranged in chronological order as far as possible; the references being to the plates in the GRAND MAROT; the PETIT MAROT; BLONDEL, *Architecture Française*, fol., Paris, 1752-6; BLONDEL, *Cours*, 8vo., Paris, 1771; BRICE, *Nouvelle Description de Paris*, 12mo., Paris, 1725; and D'AVILER, *Cours*, ed. Mariette, 4to., Paris, 1760; respectively indicated by the letters G.M., P.M., A.F., C., B., and A., as the varying authorities for the names and dates.

Mansart's first occupation was the restoration 1620 (of the ground-floor and first story, C. iii, 31) of the hôtel de Philip-

peaux de la Vrillière afterwards belonging to the comte de Toulouse, A.F., iii, 27, pl., and later to the duc de Penthièvre, which was restored (1714-5, B. i, 405) 1719 by R. de Cotte with the addition of the great gallery prepared 1812 by Delannoy for the Banque de France; G.M.; C., iii, 109, 133, pl. 17, 23; A., 360. His real "coup d'essai" was the *portail* or *façade* 1624, B., i, 276; 1629, A.F., iii, 99, pl. of the church of the Feuillans in the rue S. Honoré, destroyed for the street leading across its site to the place Vendôme: G.M.; C., iii, pl. 87. On 8 Oct. 1632 the first stone was laid for his church of the Filles de la Visitation de Ste. Marie in the rue S. Antoine: A.F. ii, 131, pl.; C. iii, 225, 365; B. ii, 226. About 1634 he completed Bullant's hôtel de Carnavalet (B. ii, 198) or Argouze (as in MAROT; A.F. ii, 149, pl.) afterwards Brunet de Rancy in the rue Culture Ste. Catherine, including a street front that carefully preserved Goujon's sculpture, G.M.; the older front by a Ducerceau is given A.F. ii, 149; and there restored the pavilions at the end of the street front of the hôtel, C. iii, 109, pl. 17 a. About 1637 he designed the still incomplete western front facing the spectator who enters the court of the château at Blois, G.M.: C. iii, 225. On 1 April 1645 he saw the first stone laid of his church and nunnery of the Val-de-Grâce in the faubourg S. Jacques (the design is in C. iii, 303, pl. 52) which church when about 9 ft. above the ground, A.F. ii, 62, pl., (PERRAULT says up to the great interior cornice), was transferred to Le Mercier who continued the lower order; but the building, after having been stopped for a long time, was handed over 1654 to Le Duc and Le Muet who finished it 1665; sections are given G.M.: and some time afterwards (cc. 1650) he gave the design for the église des Dames de Ste. Marie at Chaillot, ascribed to him in the *Cours*, iii, 369, and vi, 495; but not mentioned by PERRAULT. He then designed the hôtel erected about 1650 for François de Rochecouart de Jars (alias du Gert, du Jars, or de Jears) commander of the priory of the order of S. John at Jerusalem at Lagny, belonging later to the president de Senozan in the rue de Richelieu; P.M.; B. i, 340; A.F. iii, 80, pl., and afterwards called the hôtel de Coislin, B. i, 340. Afterwards (cc. 1657, C. vi, 496) he built the château de Maisons-sur-Seine, near S. Germain-en-Laye, for the president René de Longueuil, surintendant des finances, created 1658 marquis de Maisons; whose *carte-blanc* seems to have covered Mansart's demolition (without consulting his client) of part of the new work: the gardens were also designed by him according to PERRAULT. This building is the only one of Mansart's private edifices which remains almost entire. The stables are specially mentioned, C. iii, 236. This was his chief work according to the *Cours*, vi, 495, which gives the orders, ii, 220 pl. 92, the *avant-corps* towards the garden, iii, 85, pl. 12, and the crowning cornice, iii, 191, pl. 40: in ii, 221; and iii, 362; BLONDEL calls him "Le Dieu de l'Architecture:" eight plates by Mariette in the *Brit. Mus. Bib. Reg.* illustrate this building, which is also shown in P.M.: and a plate of details is given in ROUYER, *L'Art Architectural en France*, 4to., Paris, 1866, i, 77.

For cardinal Mazarin, Mansard erected about 1654 on the site of the hôtel de Chivry, at the corner of the rue Neuve des Petits Champs and the rue Richelieu, the cardinal's stables, and on that of the adjoining hôtel Tubeuf in the last named street, a gallery for his collection of antiquities, now the cabinet des estampes, and over all a gallery for pictures, now the cabinet des manuscrits: a ceiling is given in ROUYER, i, 78. It is remarkable that this commission is not mentioned by PERRAULT, the remainder of whose list comprises the château de (Berny a misprint often copied for) Bercy near Paris for M. de Malon B. ii, 260 (restored about 1700-13 by Le Vau), and sold to be pulled down in August 1860 by the Nicolai family; ROUYER i, 105: the château de Baleroy in Normandy; the château de Blérancourt: part of the château at Choisy sur Seine afterwards called Choisy le Roi, and of that at Petitbourg: the interior of the château de Richelieu, and of that at Coulommiers: the exterior ("tous les dehors") of the château de Gesvres in Brie,

and its gardens; a great part of the château de Fresne (Fesora of MILIZIA) near Meaux, for the secretary of state Guénégaud, with the chapel which was a reduced copy of his design for the church of the Val-de-Grâce; it later belonged to the chancellor d'Aguesseau, in whose time a plan and three sections of the chapel were published by Mariette; *Brit. Mus. Bib. Reg.*: part of the hôtel de Bouillon destroyed 1770: the restoration and embellishment for the secretary of state Guénégaud (B. iv, 115) of the old hôtel de Conty, C. vi, 495, the entrance by Mansart is given in G.M.; and in A.F., ii, 9, pl.; for the site of the hôtel des Monnaies it was pulled down 1770 with the adjoining house partly if not entirely built by Mansart for Guénégaud (B. iv, 115) shown in G.M.: and the portail or façade of the monastic church of the Minims in the place royale, G.M.; C. iii, 267, pl. 49; A.F., ii, 145, pl., as far as the second order, B. ii, 213, or lower cornice (PERRAULT) which is said to have been his last design; it certainly is dated thirteen years later than his death in the *Cours*, vi, 495.

To these may be added, restorations of the hôtel d'Aumont in the rue de Jouy, P.M., the original front in A.F. ii, 124; the staircase in A., p. 226, pl. 63 x; B. ii, 162; and VIRLOYS: a house at the corner of the rue neuve des Quatre Fils in the rue du grand Chantier, occupied by Jean Romanet, B. ii, 94; VIRLOYS: the altar of the church of the convent of the Filles Dieu near S. Sauveur, B. i, 505; and the high altar in the church of S. Martin-des-Champs, B. ii, 37; VIRLOYS. The works at the church of the hospice des Enfants Trouvés attributed to him in the English translation of MILIZIA, *Lives*, i, 178; the "very irregular" mansion of M. de Chateaufort at Paris, mentioned by SAUVAGE, *Histoire*, fol., Paris, 724, ii, 202; and the hôtel d'Albert included in the list in LAMBERT; are probably mentioned above under other titles. It is understood that about 1663 a design for the Louvre was made by Mansart much to the liking of Colbert, who (profiting by the experience of his subordinate Longueuil) required the architect to promise that it should not be altered during execution; on receiving a refusal, Colbert sent to Italy for the first design made 1664 by Bernini.

The church of the Jesuits, later the cathedral, at Blois, being attributed to a Mansart, it is probably due to the engagement of François Mansart there: as the works at Amboise for archbishop Colbert were begun soon after 1654 they must be due to the older practitioner: and as the hôtel de ville executed 1673 by Peyret at Arles is attributed to a Mansart, the design is as probably due to J. Hardouin-Mansart born 1647, as to François, who died in September 1666, aged 69 years (B. ii, 317), erroneously given as 97 in LAMBERT, who states that he left 300,000 livres, his name, his arms, and his livery, to each of the two nephews next mentioned. MANSART ROOF. 28.

MANSART (PASQUIER DE LISLE), a nephew and co-heir of F. Mansart, designed the house commenced in the precincts of the Temple by Jacques de Souvray, grand prior in France of the order of S. John at Jerusalem, 1667-70, for his successors; BRICE, *Nouvelle Description*, 12mo., Paris, 1725, ii, 73; illustrations are given in the Grand MAROT, pl. 15-8; BLONDEL, *Cours*, 8vo., ii, 185, and iii, 141, pl. 84, gives the proportions of the Doric order, which he says is given in MAROT, *Recueil des délices de Paris*, pl. 86. BRICE also, ii, 200, notices as his work a house at the end of the rue de la Couture Ste. Catherine; ii, 271, another in the rue de Charonne; and iii, 421, another in the rue de Grenelle: but, ii, 138, does not name him as the author of the *arrière coussure*, carrying with a projection of 24 ft. without an apparent abutment, the large organ in the church of S. Jean en Greve; it is ascribed to him by LEGRAND and LANDON, *Description*, 8vo., Paris, 1808, i, 154. He was admitted 1699 a member of the Academy of Architecture, where his death is not recorded. Marie Delisle, probably his sister, by marrying J. GABRIEL, contractor for the execution of J. Hardouin-Mansart's design for the pont Royale, was grandmother of J. A. Gabriel; so that this line of artists was not likely

to let die before the Revolution opportunities of keeping critics and historians informed of the merits of their relation, "le Grand Mansart." 5. 45. 68.

MANSART (JULES-HARDOUIN), born 1645 (not 1647) at Marly (B. 319), was the son of the painter Jules Hardouin (VIRLOYS says of Michel Hardouin, noticed below, whom the article HARDOUIN says was a nephew of Mansart) and of the sister of the celebrated F. Mansart: he became a pupil, and ultimately one of the co-heirs, of the uncle F. Mansart. Amongst his earliest works was the royal château de Clagny, erected 1676-80 near Versailles for Mme. de Maintenon at a cost of £260,000; but given 1685 to Madame de Montespan; it was destroyed about 1765 and only now known by the plans and elevations, fol., Paris, 1680, engraved by the hand of Michel Hardouin, then comptroller of the royal edifices: the crowning cornice is given in BLONDEL, *Cours*, 8vo., Paris, 1771, iii, 193, pl. 40; the same *Cours*, ii, pl. 40; iii, 184, notices the happy employment of niches in the vestibule at Clagny, and later in the gallery at Versailles; and gives various details, ii, 187, pl. 85; D'AVILER, 1760, p. 179, pl. 54, gives one of the niches in the salon at Clagny. The difficulties which he overcame in the management of the alterations and additions 1670-4 to the royal château de Versailles by joining the two pavilions, removing the arcades which surrounded the court, filling up the moat, and thereon building the garden front, have been forgotten in the admiration bestowed upon the gallery (seven times its width in length); the chapel 1699-1710, A. F. iv, 152, pl.; and 1685-6 the orangery, in which last work it is said he was assisted by Le Nôtre, probably in respect of the horticultural requirements. To these are added the building for the officers of the household, called the *Grand Commun*; the stables, opposite the palace, specially mentioned in the *Cours*, iii, 236; the former parish church of Notre Dame 1664 and its attached house of missionary priests; the menagerie, and the single storied building which, begun 1674, replaced at the Grand Trianon its three pavilions of former days. In DURAND, *Parallèle*, fol., Paris, 1809, pls. 58 and 61, are illustrations of the château de Marly, decorated in fresco by C. Le Brun as stated upon four plates in the British Museum, *Bib. Reg.*, (and its gardens, C. iv, 3, 64, pl. 10). It is also named, with works at St. Cloud, among the leading productions of his career by BLONDEL, *Discours*, 8vo., Paris, 1745, p. 63 and 78; C. iv, 59, pl. 7. His great staircase at St. Cloud is shown in D'AVILER, *Cours*, 4to., Paris, 1760, p. 227, pl. 63 R. The grande cascade, begun by Le Pautre at St. Cloud, is given in BALTARD, *S. Cloud*, fol., Paris, 1803, p. 13. In 1685-6 he designed the maison royale de Saint-Cyr. His greatest work, in the eyes of French critics, is the addition which he made to the church by L. Bruant at the hôtel des Invalides at Paris, usually called the 'dôme des Invalides,' dating 1676-1706, A. F. i, 192, pl.; the upper interior vault was added by Contant as the rain injured the paintings on the lower one. The circular *place des Victoires* was designed 1685-91 by him, A. F. iii, 34, pl.; C. ii, 226, pl. 92: although it is ascribed to 1684 and Prédot, by such recent authorities as BORDIER and CHARTON, *Histoire de France*, 8vo., Paris, 1860, ii, 346. Also the *place Louis le Grand*, usually called the *place Vendôme* (from its including the site of the hôtel de Vendôme) was about 1685 designed by him on an octagonal plan, BRICE, *Description*, 12mo., Paris, 1725, i, 307, which was entrusted for execution to Boffrand; the work was destroyed when the first floor was completed, and the *place* was materially lessened about 1699 in size, but still upon a design by Mansart, C. ii, 226, pl. 93.

To the above list may be added from VIRLOYS, the *galerie*, decorated by Oppenord, of the palais royal for Louis XIV, after 1692, on the site of the palais Brion built by the duc de Danville in the rue de Richelieu, in which the academies of Architecture and Painting had been accommodated; A. F. iii, 40, pl.; the new château at Meudon with alterations and decorations of the previous one, C. ii, 205, pl. 89; the hôtel de Lorges, afterwards de la Vallière, in the rue Neuve S. Augustin; the hôtel

of Gaspard de Fieubert, councillor of state, on the quai des Augustins, near the arsenal (BRICE, ii, 308); the decoration of the choir of the cathedral of Notre Dame; the high altar of the parish church of S. Paul, and of the noviciate-house of the Jesuits; the Louvois chapel in the church of the Capuchin nunnery; and the pont-royal commenced 1685 from his design by his cousin J. Gabriel whose son completed it 1688 under F. Romain. LAMBERT, *Hist. Litt.*, 4to., Paris, 1751, iii, 110, adds the 'château neuf' at S. Germain; and a design for the château at Luneville for the duke of Lorraine. DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1851, cxxiv, notices Mansart's going to Lorraine, in extracts from the journal of the marquis de Dangeau, 28 January, 1700; and 5 February, showing his designs for the buildings with the gardens amounting in cost to 500,000 francs; he also describes the present given to him by the duke. The high altar of the Noviciate of the Jesuits in the rue Pot de Fer, was executed 1709 by De Cotte, B. iii, 374.

Amongst other works attributed to him are, the hôtel de ville at Arles executed 1673, and therefore perhaps designed conjointly with F. Mansart; the hôtel de Pontac, destroyed 1800, at Bordeaux; the altar of Notre Dame at Paris 1699-1714, B. iv, 216; the alteration at Chambord, dividing the internal galleries into two stories by wooden floors, and materially altering the low screen building at the back for the accommodation of the increased retinue; the restoration after the fire 1674 of the hôtel de ville at Lyon, altering the exterior; 1690 the marble jubé in the cathedral at Orleans, destroyed at the Revolution; the church of the Annunciation at S. Denis, MILIZIA; and the hôtel de Noailles in S. Germain-en-Laye, C. iii, 98. It is curious that LABORDE, *Versailles*, 8vo., Paris, 1839, p. 68, should speak of Mansart as superseding Le Nôtre and D. Girard in the general design of the building at S. Cloud; and p. 88, should ascribe to him the château at Vaux and to Le Nôtre its gardens.

From a collection of six plates of doors, BRIT. MUS., *Bib. Reg.*, engraved by Le Pautre (cir. 1680), it appears that Mansart designed those of the salle de billard and of Monseigneur's cabinet at Versailles; of a chamber in the hôtel de Cavois at Paris; of the apartments at the great Trianon, and of the maison Lemaître at Plessis-Piquet. His titles were conseiller du roi en ses conseils, chevalier de l'ordre de S. Michel (1693), comte de Sagone, baron de Jouy, seigneur de Neuilly, d'Augy sur Bois, de château sur Allier, de Veurede et autres lieux, surintendant (7 January, 1699) et ordonnateur général des bâtiments, jardins, arts et manufactures de sa majesté. He was elected 7 February 1699 patron of the academy of sculpture and painting; and died 11 May 1708, aged 63 years according to its register, which may be preferred to that of the academy of architecture (into which he was elected 1675) giving 10 May and age 61 years. He died at Marly, but was buried in his parish church of S. Paul at Paris, whence his monument by Coysevox was removed, at the demolition of the church, to the Musée des Monuments, and is probably now at Versailles. There are three engraved portraits of him: one by Edelinck after H. Rigaud; another 1710 by Simonneau the elder after Decroy's picture painted 1699; and the last, printed and engraved by Florent le Comte. His residence in the rue des Tournelles is shown, A. F. ii, pl. 3.

By his first marriage, according to LAMBERT, he had a son who is supposed to have died unmarried, and a daughter who married Claude le Bos de Montargis, marquis du Bouchet, and lived in Mansart's house in the *place de Vendôme*, A. F. ii, pl. 7; by his marriage with Madeleine du Gueny he had two sons of whom a notice is subjoined. In order of time his chief pupils were his brother-in-law, R. de Cotte, who seems to have assisted him until his death, probably on account of the very weak state of his eyes, and to have succeeded him in the royal works; and has therefore much of the credit of the chapel at Versailles, the Ionic order at the Trianon, and the 'dome des Invalides.' Cailleteau L'Assurance: his cousin J. Gabriel: and after 1685

G. Boffrand. LEGRAND and LANDON, *Descr.*, 8vo., Paris, 1808, i, 156; iii, 9, 15: DUCHESNE, *Notice sur la vie, &c.*, 8vo., Paris, 1805: LAMBERT, *Hist. Litt. du regne de Louis XIV.*, 4to., Paris, 1751, iii, pt. 2, p. 110.

MANSART (JACQUES HARDOUTIN), comte de Sagone, and sieur de Levi, was apparently the elder issue of the marriage of Jules, the subject of the preceding article, and Madeleine. He built the royal parish church of S. Louis in the Parc aux Cerfs at Versailles; BLONDEL, *Arch. Franç.* fol., Paris, 1752-6, iv, 100; *Cours*, 8vo., Paris, 1771, iii, 89. He also erected the buildings of the dames religieuses de S. Chaumont, the royal abbey at Prouille in Languedoc, and many other superb buildings according to LAMBERT, *Hist. Litt.*, 4to., Paris, 1751, iii, 110, who makes him the junior issue, but may be corrected by that author's own assertion that this was a member of the academy of architecture at Paris, whose registers notice his election 1735 with the above titles, but do not mention his death.

MANSART DE JOUY or DE JOUI (. . .), was apparently the younger issue of the marriage of Jules and Madeleine above-mentioned. He appears in PIGANOL, *Nouvelle Description de la France*, 8vo., Paris, 1722, as declining his fees for the *portail* or *façade* of the church of S. Eustache (1532-1642) at Paris, but accepting apartments from the churchwardens in one of the houses belonging to that fabric; yet in the *GAZETTE DE FRANCE*, 1753, p. 420, it seems that his project had been revised by Moreau into a very complete resemblance with that of the church of S. Salpice; the first stone was laid 22 May 1754 by the duc de Chartres; the work is mentioned as proceeding under Mansart in BLONDEL, *Cours*, 1771-77, iii, 89; but in 1808 the work was not complete. LE ROUX and CALLIAT, *S. Eustache*, fol., Paris, 1850, p. 19.

MANSDAELE (ROMBAUT VAN), see KELDERMANS (R).

MANSE. The parsonage; the house allotted to a minister of the gospel for his dwelling. The use of this term is chiefly confined to the northern parts of Great Britain. In the capitulary of Charlemagne, the Lat. *mansus*, signified the particular portion of land assigned to every churchman. So early as 1336 it was used for the parsonage house; JAMIESON, *Dict.* 1808.

MANSER or MANISSA, see MAGNESIA AD SIFYLUM.

MANSFIELD QUARRIES. These quarries are situated within a circle of two miles round the town of Mansfield in Nottinghamshire, giving three distinct coloured stones. The "Rock Valley" district contains the "Red Bunter" sandstone, where the red Mansfield stone is obtained. The strata is the very lowest of the new red sandstone, being known as the (Ger.) *bunter* or variegated sandstone. The valley was used in ancient times as a place for procuring stone; the present workings differ somewhat from them, inasmuch as the stone is now only procured from the five or six dense beds which lie below the old workings, and being below the level of the river, the water has to be pumped out by machinery. The composition consists of grains of silica, cemented together with carbonate of lime and carbonate of magnesia, the red colour being imparted by the presence of iron (the analysis is given *s. v.* Magnesian limestone); the weight per cubic foot is 148 lbs. 10 oz. avoird. The labour upon the lower beds is much greater than upon the upper ones, and is ten per cent. more than upon Portland stone; the cost of quarrying and raising the heavy masses from their low level is very considerable. The stone from Lindley's deepest quarry may be had 5 or 6 ft. thick, and should be used bedwise for columns or plinths having unusual weight to carry.

The white Mansfield stone, obtained on the south side of the town, is the same stone as the red, its geological and other features being identical, only it contains less iron, and is consequently whiter in colour. The red and yellow stones are worked at separate points, viz., on the south and north sides of the town, the two colours not being intermixed, as in some other quarries. The formation of the white stone in the quarry is reversed, the

thicker and less stratified beds resting at the top. The labour is about the same as upon Portland stone, and the blocks are very large. When hardness is required, the lower and thinner beds about 2 ft. thick are recommended, and may be cut in lengths of 15 ft. or 20 ft., and transported with safety. The weight per cubic foot is 146 lbs. 9 oz. avoird. The white stone was used in building the town hall at Mansfield about 1834 under W. A. Nicholson of Lincoln.

The stone of the Mansfield Woodhouse old quarry is of an older and lower formation than the above, being Magnesian limestone. It is the stone reported upon so favourably by the commissioners on Building Stones in August 1838, under the name of Bolsover stone, that it was selected for the construction of the new houses of parliament, and for a time was employed in the lower part of the river front of that building where it shows no decay. The existence of this quarry, buried amid trees and underwood, was unknown prior to the visit of the commissioners. The marked durability of the stone employed at Southwell minster rendered it necessary to discover whence the stone was extracted; and by the aid of the church records, and very much by local traditions, the old quarry was at last discovered. The stones from Southwell being found to tally bed by bed with the ancient quarry face, steps were immediately taken by the authority of Sir Charles (then Mr.) Barry to develop its capabilities to the utmost. The whole was placed under the control of Mr. Lindley the local quarryman, by whom a large supply was quickly sent to Westminster. But the difficulty of obtaining large blocks, and the fact of the building contractors having obtained the lease of another quarry at Anston, led gradually to the substitution of one stone for another. This stone is of a yellow colour, is of uniform character throughout, and is composed of carbonate of lime and carbonate of magnesia in about equal proportions; the dark spots seen on the newly fractured portions are iron or manganese; the weight per cubic foot is 145 lbs. 12 oz. avoird.; MAGNESIAN LIMESTONE. At these quarries the stone is highly crystalline, in which state it is termed a true DOLOMITE. The old quarries are in a field adjoining the present ones; the blocks obtained were not large, the old builders contenting themselves with the top thin bedded stones. The average size of blocks now obtained is much smaller than that of the *white* stone, but in point of goodness require no selection. A letter from G. G. Scott notices the use 1841 of the stone from the old quarry for the martyrs' memorial cross at Oxford; BUILDING NEWS *Journal*, 1860, vi, 278.

At Pleasley Vale is a quarry containing the lower strata of the Magnesian limestone, and below it the red or variegated sandstone known as the lower red sandstone of the permian system: they possess a range of colour from red to yellow, are durable stones, and are used indiscriminately by local builders. STEVENSON, *Building Materials of Nottinghamshire*; and in BUILDING NEWS *Journal*, 1867, xiv, 637. SMITH, *Lithology*, 4to., Lond., 1845.

MANSION. An abode, a house, a place of residence, generally of one of the higher classes. "Mansion house" is the name given to the residence of the lord mayor of London; this edifice designed 1739-53 by G. Dance, is illustrated in WOOLFE and GANDON, *Vit. Brit.*, fol., London, 1767-71, i, pl. 44-50.

MANTAPA. The Hindu term for the porch attached to most *Vimanas* or temples beyond the ANTARALA. It is a square building, in plan nearly identical with the vimana, having a door on each of its four sides, one leading to the cell of the temple, the other three admitting light and access to its interior; the roof is generally pyramidal. To this another porch sometimes succeeds; when this is the case, the inner one is distinguished as the *ardha mantapa*, the outer one as the *maha mantapa*. When joined together the outer one is generally open in front and closed only on the sides, so that it does not materially obstruct the passage of light to the interior. Sometimes it is detached, and then takes any form that fancy

may dictate. The roof of these porches when large is supported by pillars; but the Hindu architects never willingly resort to this expedient, generally reducing the bearing as far as possible by bracketing and projecting cornices; then aiding the long stones that form the ceiling by beams of wood or even of iron laid under them, so as to gain the requisite strength by any contrivance rather than by pillars; FERGUSSON, *History of Arch.*, 8vo., London, 1867, ii, 563-5. CHAORI; IRON.

MANTEL PIECE, formerly written mantil; and now sometimes mantle (Sax. *mantel*; Lat. *mantellum*; It. *mantello*; Sp. *manteo*; Fr. *manteau*, *traverse*; old Ger. *mantal*; Welsh *mantell*). A cloak or covering; hence it is a term given to that piece of timber or stone in front of a chimney, concealing, covering, or mantling, part of the fireplace; NOTES AND QUERIES *Journal*, 1 Ser. ix; x; 3 Ser. x; wherein it is also stated that the word is derived from the practice in France and Italy of hanging wet clothes to dry from pegs secured to the cupola or mantel; BUILDING *Journal*, 1856, xiv, 512.

Besides the explanation given *s. v.* CHIMNEY MANTLE, it will be well to notice that the Act for the better regulation of buildings and party walls in London and Westminster, 12 Geo. III, cap. 73, 1772, directs that "every mantle between the jambs of chimnies shall be arched over with brick, or set upon an iron bar or iron bars; and that no wood or wainscot whatever shall be placed or affixed to the front of any such jamb or mantle nearer than five inches from the inside of such jamb or mantle:" and "Item the making of all mantle-trees, tassels, and footpeaces, of timber," was considered the work of the carpenter, cir. 1632; JUPP, *Company of Carpenters*, 8vo., London, 1848, p. 300. *Illustrations*, *s. v.* Chimney piece, 1856-7; 1858-9. FIREPLACE; HOOD; LINTEL.

FOSBROKE, *British Monachism*, 3rd edit., 8vo., London, 1813, p. 473, says "The canopy over shrines called *Mandualis*, whence mantel piece, *requies*, *ripa*," etc.

The word is also found used with 'wall' in the following passage:—"June 5, 1609. The great wind blew down the stanes of the *mantil wall* of the kirk in tyme of Sermone, and terrifit the peopell;" MAITLAND CLUB, *Perth*, 4to., Edinb., 1831, p. 12.

MANTINEIA. An ancient town of Greece situated in the Morea, about eight miles north of Tripolitza. The circuit of the walls, with the exception of four or five towers on the eastern side, is still entire; in no place are there more than three courses of masonry existing above ground, leading to the supposition that the remainder of the work was constructed in sun baked bricks; the facing is constructed with large wrought stones put together without cement, the middle being filled up with a rubble of broken stones mixed with mortar; the inner lining was 2 ft. thick, the outer 4 ft., and the rubble 4 ft., total 10 ft. There were ten gates; and the circuit of the walls was protected by a wet ditch; LEAKE, *Travels in the Morea*, 8vo., London, 1830, i, 103-11. W. G. CLARKE, *Peloponnesus*, 8vo., London, 1858, p. 125-41. The city itself has long ceased to exist. Its site is partly occupied by the modern village of Paleopoli.

BLOUET, *Morée*, fol., Paris, 1833, ii, pl. 53-4, shows the walling and the theatre: it is stated to be about 227 ft. or 240 ft. external diameter, and to be one of the very few erected in a plain, in LEAKE, *Asia Minor*, 8vo., London, 1824, p. 327-9.

MANTEL, see MANTEL.

MANTOVA (Fr. *Mantoue*; Engl. *Mantua*). The capital of the province of the same name in the north of Italy, and the see of a bishop. It is situated on two islands formed by the river Mincio, and in the midst of lakes and marshes; these with the fortifications on every side make it rank as the first fortress in Italy. The country round was drained by Brunellesco. Several bridges communicate with the main land, the longest of which, the ponte di S. Giorgio, forming the principal approach, considered a masterpiece, is upwards of 2500 ft. in

length; it dates 1401 and was originally covered. The ponte Mulina forms a dam in which are twelve mills each having a statue of an apostle; it was built 1188 by Alberto Pitentino and is still covered; it is entered by a fortified gateway or tower in which is a pointed window divided by a central mullion: the porta Mulina is an imposing Doric structure. The saw mill near was erected 1400 by Girolamo Arcari. The streets are regular and wide, in many places badly paved; the houses are substantial, often rising in huge masses, with rows of long and lofty arcades over the footway, forked battlements, and feudal towers. The assemblage of buildings which, beginning at the porta di S. Giorgio extends from the piazza di S. Pietro to the lago Inferiore is almost unique of the sort. There are no large squares; the piazza Virgiliano, drained and planted by the French, is lined with good mansions; the piazza d'Erbe is the market place; in it is a decorated house front in terra cotta sustained by an arcade of Corinthian columns; the piazza di S. Pietro is the esplanade; the piazza del Argine has a marble pillar bearing a bronze bust of Virgil.

The duomo dedicated to S. Pietro has one side wall of the original structure remaining, with gables and pinnacles of molded brick; and a fine romanesque campanile: the interior was rebuilt on a design by Giulio (Pippi) Romano, and completed by his pupil G. B. Ghisi (Bertano); the front is by G. Genga; the capella della Madonna Incoronata is by L. B. Alberti; the tomb to Pietro Strozzi is by G. Pippi. The church or basilica di S. Andrea 1472, designed by L. B. Alberti, superintended by L. Fancelli, is 310 ft. long; the vaultings of the aisles are bold and skilful; the plan of the *apse* is given in *Illustrations*, s. v. 1856-7; it has a crypt; the cupola by F. Juvara dates 1732-81; the bold brick Gothic campanile of the earlier building is still standing (STREET, pl. 187, 275). The collegiate church of Sta. Barbara, (of the HANDBOOK and others, S. Barnaba of WEBB) in the palace 1562-5 by G. B. Ghisi (Bertano) has a four-storied campanile dated 1565 also by him. The church of S. Sebastiano (its square red brick tower, rather low, is of romanesque character) 1460, by L. B. Alberti, is now closed; as is also that of S. Cristoforo, late romanesque with scarcely any windows: S. Francesco, of the fourteenth or fifteenth century, is now used with its monastery as a store for artillery and for barracks. S. Gotardo has a brick campanile 1336 described s. v. in *Detached Essays*, p. 5; and S. Maurizio formerly Napoleone is of late date: there are many other churches with no pretensions; and two synagogues in the Ghetto quarter, one of which, the scuola grande, has been recently completed.

The castello di Corte, the ancient fortress palace erected 1393-1406 for Francesco Gonzaga IV by Bertolino Novara, with machicolated towers (STREET, p. 185) is now used partly as a prison and as public offices; many frescoes remain. The ducal palace, an immense edifice begun 1302 for Guido Buonacolsi surnamed Bottigella, third sovereign lord of Mantua, has the front only remaining (STREET, p. 183). It was transformed entirely by Giulio Pippi, and continued by Primaticcio; G. B. Coi; G. B. Ghisi (Bertano); F. Galli Bibiena, and later artists. Many of its five hundred rooms retain much of their former splendour, but a great proportion have been converted into storehouses and barracks, and it was lately called the palazzo Imperiale, palazzo Vecchio, and corte imperiale. Among the more noticeable features of this vast structure are the riding school (*cavallerizza*) in the great cortile, designed about 1690 by F. Galli Bibiena; the front and the giardino pensile on a terrace raising it to a level with the upper floor, and surrounded with a richly painted loggia all designed by Giulio Pippi; the stucco ornaments of the doors and wood carvings in the camere degl' Arazzi and of other chambers from the designs of Primaticcio; the gallerie degli Specchi or ball room; the great audience hall with its ceiling carried by large consoles; the galleria de' Marmi; the appartamento di Troja by Mantegna and Pippi begun 1524, leading to the

sala di Troja by the latter; and the scalcheria or hall of the seneschals, having a richly decorated ceiling said to be one of the first paintings done in the city by Pippi. A general plan of the structure is given in the HANDBOOK, from GRUNER, text, pl. add. 3. Opposite the palace is the palazzo Baldassare Castiglione with a carved gateway; on one side of it is the bishop's palace (STREET, p. 272) restored cir. 1540 by G. Genga; and on the other side the palazzo Guerrieri, altered cir. 1600 by G. Luziano; close to which is the old torre della Gabbia, annexed to the palazzo formerly Buonacolsi and erected 1302. The torre dello Zuccaro near, is another memorial of the old factions. The palazzo Colloredo in the via Larga was built by G. B. Ghisi (Bertano) from the designs of Giulio Pippi whose own house 1516 or 1544 is nearly opposite; in 1800 it was restored for L. Mambrini by Paolo Pozzi. The palazzi Valenti, Andreassi, and others, were altered cir. 1600 by G. Luziano. The palazzo del Diavolo with an exterior painted by Pordenone is now cut up into shops and dwellings. The palazzo della ragione 1198-1250 (STREET, pl. 186) has a lofty campanile, the torre del Orologio, with a clock dating 1478. The scuole pubbliche were formed out of the Jesuits' college, the library contains about 80,000 printed volumes; and the museum of antiquities. The monte di pietà was the principal house of correction for the whole of Lombardy.

The abattoir (beccheria) and the fish market (pescheria), both on the river bank, were designed by Giulio Pippi; the former is given s. v. in *Detached Essays*, p. 6, pl. 3. The teatro Sociale, 1818-22, is by L. Canonica: the anfitheatro Virgiliano 1820-1, for shows and games, is by G. Cantone of Foil.

Near the city is the palazzo del Té, or T as formerly written, from the form of the roads and avenues by which it was approached producing that letter (BERTAZZOLI, *Urbis Mantuae Descriptio*, 2nd edit., 1628). It was designed and painted 1525-30 for the marquis Federigo Gonzaga by Giulio Pippi with the assistance of his pupils Primaticcio, G. B. Pagni, and Rinaldo Mantuano; and it was restored 1783 by Paolo Pozzi. The chief structure is 180 ft. square, with an interior court 120 ft. square; the Doric order is used throughout. The loggia of the grotto is given in outline and in colours in the *Illustrations*, s. v. Loggia, 1850-1, pt. i, pl. 60, 61, 72; Arch., 1850-51, pt. i, pl. 52; and Metal work, 1859. BOTTANI, *Descrizione delle pitture*, Mantua, 1783; GRUNER, *Fresco Decorations*, gives pl. 22-3, plan, &c.; decorations of the hall of David, and the casino and terra cottas. At a distance of six miles from Mantua is the late Gothic church of Sta. Maria, or il Santuario, delle Grazie, 1399, consecrated 1406 (ZANOTTI): upon richly carved and gilt columns arranged above the arches upon each side of the nave, is a range of votive life-sized statues coloured to represent nature; some are dressed, others half nude, and some naked, representing the actual personages who thus testify, in literal transcripts of the circumstances, the perils they escaped by the aid of the Virgin. Five miles distant, the palazzo at Marmiruolo is by Giulio Pippi.

GRUNER, *Fresco Decorations*, fol., London, 1844, gives pl. 24-7 some in the ducal palace; and in his *Specimens of Ornamental Art*, fol., London, 1850, gives pl. 29, two pavements in 'terrazzo Veneziano' at the palace; pl. 52 and 69-74, portions of ceilings, friezes, and cornices by Primaticcio and Pippi in the palazzo vecchio; and pl. 61-8 portions of a ceiling and cornice from the Gabinetto d'Isabella d'Este by Giulio Pippi. BARTOLI, *Sigismundi Augusti*, Rome, 1670; 2nd edit., 1680; Paris, 1675; gives the sala de' Stucchi. ZANOTTI, *Mantova*, twenty-five lith. views of the buildings, fol., Venice (1851, &c.); BETTINELLI, *Delle lettere e delle Arti Mantovane*, 4to., Mant., 1774; ANTOLDI, *Guida*, 3rd edit., 12mo., Mant., 1821; CADIOLI, *Delle Pitture*, etc., 1763; *Guida di Mantova*, 8vo., 1831; SUSANNI, *Prospetto delle P. S.*, ed. A., 8vo., 1828; *Monumenti di P.*, e S., fol., Mant., 1847-9; STREET, *Brick and Marble Architecture*, 8vo., Lond., 1855; WEBB, *Ecclesiology*, 8vo., Lond., 1848; WOODS, *Letters*, 4to., London, 1828, ii, 116. 28. 50.

MANTUANO. The common name of a family of artists at Mantua during the sixteenth century. The chief of it, GIOVANNI BATTISTA, is also called GIOVANNI Mantuano, and also BERTANO, see GHISI (G. B.) 14.

MANUAL LABOUR, see DAY; DAY-WORK; DAY'S WORK; LABOUR; MAN; PIECE WORK; TASK WORK; WAGES.

MANUBIAL, or MANUBIARY, COLUMN; see MEMORIAL PILLAR.

MANUFACTURE, ART IN. It may be sufficient merely to refer to several papers on this subject.

PAPWORTH, *Benefits resulting to the Manufactures of a Country from a well directed cultivation of Architecture, and of the Art of Ornamental Design*, read 27 July 1835 at the Royal Institute of British Architects, and printed in *Transactions*, 4to., 1836, i, 111. *Report of the Select Committee on Arts and their connection with Manufactures*, fol., Lond., 1836. O. JONES, *Attempt to define the Principles which should regulate the employment of Colour in the Decorative Arts*, 8vo., Lond., 1852. WYATT, *Attempt to define the Principles which should determine Form in the Decorative Arts*, 8vo., London, 1852: and *Principles of Design applicable to Textile Art*, 4to., Lond., 1858. CRACE, *Application of Art in Manufactures* in *Builder Journal*, 1859, xvii, 92, 113.

FURNITURE; GLASS; IRONWORK; MARQUETRY; METAL WORK; MOSAIC; PAPERHANGING; PARQUETRY; POTTERY; TILE; WOVEN FABRIC; WOOD, and STONE, CARVING, etc.

MANURE PIT: MANURE SHED: LIQUID MANURE TANK. As the principles which decide the proper management of farm-yard manure, so far as arrangements for its preservation are concerned, affect all three subjects named, they will be treated under one head. At the stables attached to houses in London, the manure heap is confined till removal, either below or above ground. In the first case, it is usually made in half brick walls in cement attached to a main wall, with a floor of bricks laid flat in cement, and sloping to a connection (well covered by a stone) with the drainage from the stable; the floor and walls are usually cemented, and it has a curb with flap trap doors, and water-joint hinges. In the second case, they are generally constructed with walls 9 ins. thick if the size requires it. This arrangement allows the liquid manure to run to waste. In a model farm yard in Hertfordshire, some forty years ago, not a straw was to be seen after an early hour; even the (apparently drainage) pool in its centre for ducklings, etc., was fresh water: a drain round the buildings took off all the liquid manure to a tank for horticultural purposes, and the solid manure was carried to a covered dungpit, such as above described for stables in London; but of course as much larger as the number of stock on the farm and the time necessary for the decomposition of the manure would require. It is therefore so long ago that advanced agriculturists saw the folly of piling heaps of manure in the open air without cover, from which cause alternate washing and evaporation destroyed the value of the stuff. Indeed MENCHI, *Letters on Agricultural Improvement*, 4to., London, 1845, p. 11, may be quoted at the present time with little alteration. He says "The manure tank is bricked, and set in cement. * * * As we pump out the liquid manure from the well, which is 3 ft. deeper than the tank, no solid manure can enter, there being proper gratings to prevent it. We choose a wet day, when nothing can be done on the land, to turn over the manure in the tank; there being a slated roof over it which keeps the men dry. It faces the north, so that the sun cannot shine on it to evaporate the ammonia and strength of the manure. * * * We find the tank-manure of extraordinary strength, as well as density, from subsidence by fermentation and pressure. When filled to 4 ft. above the ground, it contains about 200 loads of solid manure. * * * The piggeries, paved with flagstones, discharge their moisture into the manure-well." It may be assumed that he omitted to give the size of his two (communicating) manure pits 6 ft. deep, 5 ft. wide, respectively 45 and 32 ft. long, the well being formed at one

end and outside of it, with a pump over. The remarks at p. 24 on the management of manure, and p. 50 on the results of feeding, require consideration. FARM BUILDINGS.

MANX FLAGSTONE. The beds of the black flagstone (Poseidonian schist) of Poolvash, found on the south side of the Island of Man, near Castletown, and belonging to the carboniferous limestone, vary in thickness from a few inches up to 20 ft. Being too soft to take a polish, it is generally finished with lamp black and oil; or, in some cases, with French polish. It is very easily wrought, but its durability is well seen in the steps of S. Paul's Cathedral, London (presented about the commencement of the last century by bishop T. Wilson). Messrs. Quilliam and Creer lease the quarries from the crown. Plain slabs for hearths, etc., at the place of shipment cost 10d. per square ft. Specimens, inlaid with a composition in patterns, were exhibited in 1851, had cost about 2s. 3d. per square ft. Besides the bituminous limestone, there is a flagstone at Spanish Head, not far from Castletown, obtained from rocks of the older Silurian date. Though soft and slightly elastic, and worked with great facility, it is very durable, as shown by the Runic monuments in the island. It has been used for flooring, and is well adapted for prison cells. The granite of the island is considered to be very useful for curbstones and paving. 71.

MANZINI (FRANCESCO), obtained particular success in erecting country houses near Carpi in the late duchy of Modena; amongst them, the casa Caleffi in Sta. Croce; the casa Cabassi; the casa Bellentani, afterwards Gabardi; the casa Ciarluni, afterwards Bianchini, all in Cibenno; and the casa Grillenzoni in Roveredo, are specified by TIRABOSCHI, 1786, who notices that Manzini died about the end of the preceding century. 93.

MAP. A plan of an estate, of a country, or of countries.

MAPILTON (THOMAS), master mason, was employed on the works 1408-19 of the cloisters in the cathedral at Durham, at the wages of £5 6s. 8d. per annum, with a garment at Christmas worth 13s. 4d. He was succeeded by W. Hyndley. (RAINE) *A Brief Account*, etc., 8vo., Durham, 1833, p. 87-8.

MAPLE WOOD, the produce of the genus ACER. The Acer macrophyllum, and Acer saccharinum, produce the Bird's eye maple wood used for furniture; and Acer rubrum, the 'Curled' maple wood. When green it weighs 61 lbs. 9 ozs. per cubic ft.; when dry, 51 lbs. 15 ozs. A maple wood cabinet, at Arno's-grove, Southgate, is mentioned by BREWER, *London and Middlesex*, 8vo., London, 1816, x, pt. 4, p. 711. Dyeing maple wood with cochineal to embellish it, is noticed as an old Swedish practice, in LOUDON, *Architectural Magazine*, 8vo., London, 1834, ii, 240.

STEVENSON, *Building Materials of the United States*, read before the Society of Arts for Scotland 1841, and given in CIVIL ENGINEER, etc., *Journal*, iv, 268; PENNY MAGAZINE, 1843, xii, 133; *Building News Journal*, 1856, ii, 730.

MAR. A portion of the land measure called CHINGALI, used in India. It is supposed to be 6 ft. 6 ins. long, though found 6 ft. 5 ins., and even 6 ft. 9 ins.

MARABITI (IGNAZIO), built in the eighteenth century the monastery of S. Martino near Palermo.

MARAIIS (. . . DE OR DES), chief architect to king William III of England, designed 1690-97 the palace at Loo in Holland, under the direction of the earl of Portland. MAROT executed the gardens and fountains; W. HARRIS, *Description of the palace*, 4to., London, 1699, p. 47. LOUDON, *Gardening*, 8vo., Lond., 1850, p. 51-3. STURM, *Civil Baukunst*, fol., Augsburg, 1721-61, vi, pl. 7, plan of grounds; and STURM, *Architectonische Reise-Anmerkungen*, fol., Augsburg, 1719, pl. 7.

MARANI (FRA EVANGELISTA), furnished the design, which is still preserved in the Demanio, for the portico of the church of S. Domenico at Bologna; MARCHESE, *Lires*, 8vo., Dublin, 1852, i, 344.

MARATTI (. . .) designed the great chapel built by S. Cipriani, cir. 1700, in the church of Sta. Maria degli Angeli at Rome.

MARAVEDI. A Spanish coin, frequently mentioned in this work, 680 being equal to 4s. 2½d. of present money.

MARAZZI (JACOBO), "named il Vignuolo architetto," in LOMAZZO, *Trattato dell'Arte*, 4to., Milan, 1555, p. 690, 699, is perhaps meant for BAROZZI (G.)

MARBLE (Lat. *marmor*; It. *marmo*; Sp. *mármol*; Fr. *marbre*; Ger. *marmor*). Under this head are included all the semitransparent, semi-crystalline, or crystalline forms of carbonates of lime to which the name of marble has been applied. The finest sorts for statuary purposes, from Carrara, are of a pure white; and from Paros of a waxy cream colour; others are mixed with various metallic oxides, occurring in veins, and producing clouded and coloured varieties, used for various ornamental purposes. The elasticity of marble is 2·15; ANSTED, *Geology*, 8vo., London, 1856.

Any limestone possessing sufficient hardness to take a polish may be called a marble. Many of these are fossiliferous; but statuary marble, which is also called saccharine limestone, from its possessing a texture resembling that of loaf sugar, is devoid of fossils, and belongs to the metamorphic series of rocks. 70.

The BRECCIA marbles are chiefly siliceous.

"It would be difficult to determine where stone terminates and marble begins; scientifically, they may be considered nearly identical; pattern or colour is an immaterial distinction. If a fine-grained limestone be sufficiently hard and compact to take a good polish, it generally receives the more dignified name of 'marble,' although it may only possess such chemical qualities as are common to all calcareous earths.—The decay of statuary marble is facilitated by variations of temperature, which have a tendency to expand and contract the crystals, and thereby cause disintegration; of course this is most injurious where the variations have the widest range. If Carrara marble be fully exposed to atmospheric influences, the part most exposed to the heat of the sun will be destroyed before that which is in the shade. The mantel of a chimney-piece, immediately over the fire, is invariably in a crumbling condition long before the sides, or those parts which are not so exposed to heat, become so. If exposed to the weather for thirty or forty years, the crystals no longer adhere firmly to each other; the external appearance may remain unaltered, but the influence of the weather continues to penetrate deeply into the mass, the cohesion of the particles is imperceptibly destroyed, and after the lapse of about a century, it entirely falls into a kind of sparkling sand." This is described in detail in *BUILDER Journal*, 1864, xxii, 911.

"Many of the coloured marbles, whether British or foreign, are liable to defects of unsoundness, especially if the colours are not gradually blended one into the other. A large rock of variegated marble appears to have been formed during remote ages of the world by a congeries of small pieces of older rocks of different colours, sometimes firmly united into a compact solid block with a paste of natural cement; but it frequently occurs that the parts which were originally separated are not so strongly joined as to bear the effects of hammer and chisel during the long continued operations of the mason or carver; so that what was at the commencement of working a very insignificant crack or weak place, ultimately may come to pieces, in consequence of repeated vibratory concussions; and this may happen after the cost of two or three weeks' labour." C. H. SMITH, in HUNT, *Companion to 1862 Exhibition*, 8vo., Lond., 1862, i, 324.

Some extremely fine specimens of white marble are to be seen in the Borghese palace at Rome, which on being poised by the centre on a hard body, bend very considerably. It is found that statuary marble exposed to the sun acquires in time this property, thus indicating a less degree of adhesion of its parts than it naturally possessed. Reference to the corrosion of marbles in churches, occur in NOTES AND QUERIES *Journal*, 3 Ser., xii, 307. ATMOSPHERIC INFLUENCE. 1.

Two blocks of Ravaccione marble, each 4½ ins. × 4 × 3 deep, weighing about 5 lbs. 9 oz., were each fractured by a total weight of 78·5 and 49·5 tons, or an average of 3·55 tons per

sup. inch; and crushed with an average weight of 4·30. Two similar blocks of Veined marble weighing 5 lbs. 6 oz. and 5 lbs. 9 oz., fractured with 2·12, and crushed with 4·13, tons, per sup. inch; Institution of Civil Engineers, *Transactions*, 4to., Lond., 1836, i, 235, whose Table is given in MAHAN, *Civil Engineering*, 4to., Edinburgh, 1845, p. 143. The crushing weight of marble is stated to be 6,000 lbs. per square inch, and its tenacity is put at the same amount (HUNT). 1.

Experiments made under the inspection of a committee of the Royal Institute of British Architects, and given in *Sessional Papers* 1863-64, Tables E and F, p. 170, showed that 4-inch cubes of

Cornwall Serpentine, Poltesco green, cracked with 25·0 tons; at 15·4 tons slightly; at 40 tons going fast; and crushed with 52·0 tons.

| | | | |
|---|---------|-------|------|
| Cornwall Signal Staff black and red ... | 10 tons | 5·10 | 3·2 |
| " " " " " " | 10·50 | 37·75 | 2·35 |

Shafts 12 ins. long and 3 ins. diam. of Devonshire marble.

| | | | |
|---|-------|-------|------|
| Ipplepen, mottled red ... | 9·2 | 1·7 | 1·37 |
| Poltesco, grey green { (went across and) | 4·3 | 4·3 | 4·0 |
| { not with vein } | | | |
| " " (went at once) ... | | 6·0 | 5·1 |
| Signal Staff, red and black (went in fragments) ... | 20·0 | 33·3 | 1·73 |
| " " (ditto) ... | 20·0 | 22·5 | 3·18 |
| " " ... | 12·75 | 16·25 | 2·2 |
| Cadgwith, green and black ... | 16·92 | 17·62 | 2·19 |

The tensile strength of Sicilian marble was found to be—

| Section of | Breaking weight in lbs. | 1 | 1 |
|-------------|-------------------------|------|---|
| 1·13 × 1·01 | 1064* | 931 | |
| 1·02 × 1·13 | 1394 | 1216 | |

* at 800 lbs. not damaged, a slight crack before breaking.

Weight of marble per cubic foot avoird.

| | | | |
|---|-----|----|---|
| Black marble of Kilkenny ... | 171 | 6 | 0 |
| Tiree marble, Hebrides ... | 172 | 5 | 0 |
| Statuary white marble of Carrara ... | 175 | 10 | 5 |
| Ravaccione ... | 160 | 2 | 8 |
| Ipplepen, Bartons' quarry, Devonshire ... | 163 | 6 | 0 |

13 ft. cube of veined marble, and 13½ ft. of statuary marble, are generally stated to equal a ton weight.

Marbles have been divided into eight classes: 1, the Plain coloured, as the black and the white; 2, the Variegated; 3, the Madrepora; 4, the Shell; 5, the Lumachello; 6, the Cipolino; 7, the Breccia; and 8, the Puddingstone.

Marble, either Italian, Veined, or Dove, is invariably sawn into scantlings varying in thickness from 1 to 2 ft. at the quarries. Sicilian or Ravaccione is in scappled blocks, and not sawn. All other marble comes almost rough to the mason's yard, as little is done to the block beyond knocking off such corners and other projections as are not too valuable to interfere with convenience of transport: the block, however, is sometimes sawn into two or more portions: in the yard it has to be sawn into smaller pieces according to the use intended; it is then ready to be rubbed with coarse and finer sands; by friction with grit-stone; then with various sorts of hone slates, of which "snake" is most in vogue; and finished with glass-paper to carvings, or with Dutch rush for alabaster; or polished by hand or by machinery, as may be desired. The *grounding* or smoothing of the best works is effected with a succession of fine emeries, with which the surfaces may be made very smooth; and polished with tripoli or putty powder. "Plain face" is never quoted in the PRICE BOOK as regards marble. (NICHOLSON, *Dict.*) Sawing and polishing machinery, worked by steam power, is explained with illustrations in APPLETON, *Dictionary of Mechanics*, 8vo., New York, 1852, ii, 309-14. 4.

The following names of so called marbles, many of which are not limestone, are the principal ones used by the English, French, and Belgian, makers of chimney-pieces:

| | | |
|----------------------|------------------------|----------------------|
| Bardiglio | Blanc et noir de petit | Brèche violette |
| Belgian black | antique | Brocatelle d'Espagne |
| Belgian fossil | Bleu Belge | Brocatelle violette |
| Black and gold | Brèche imperial | French red |
| Black and green | Brèche rose | Garibaldi |
| Blanc clair (or pur) | Brèche seranceline | Griotte |

| | | |
|-----------------|------------------|-------------------|
| Italian griotte | Napoleon rose | S. Gerard |
| Italian veined | Pavonnazzo | S. Remy blue |
| Jasper | Petit antique | Sicilian veined |
| Jaune fleuri | Porphyry | Siena |
| Jaune Lamartine | Rouge de Sicilie | Statuary |
| Jet black | Rouge fleuri | Verde di Corsi |
| Languedoc | Rouge griotte | Verde da Genoa |
| Leopold | Rouge royal | Vert des Alpes, |
| Malachite | Sarracolin | d'Egypte, Morris, |
| Mazagran | S. Anne | de Mer |

The following list comprises many of the names of other marbles, ancient and modern; as also references to articles in this Dictionary were they are explained or described.

| | | |
|-----------------------|---------------------|--------------|
| Alabaster; Artificial | Hopton wood stone | Phengites |
| Atracium | Hyemettian | Phrygium |
| Bardilla or Bardiglio | Laconicum | Polzevera |
| Beaume | Lesbos | Portor |
| Bergamo or Paragone | Lucullum | Porto Venere |
| Black | Lunense, or di Luna | Proconnesian |
| Brecia | Lybicum | Purbeck |
| Campan | Maculosum | Ravaccione |
| Carrara | Madrepore | Red |
| Connemara, or green | Mandelato | Rhodian |
| Carystus | Marezzo | Rosso Antico |
| Chernites | Marmora | Sangarium |
| Chium | Marpossian | Scagliola |
| Cipolino | Maximin | Serapcoline |
| Coraliticum | Melos | Serpentine |
| Corinthian | Memphites | Synnadicum |
| Cyzicum | Molassium | Thasus |
| Derbyshire | Nero antico | Tinos |
| Devonshire | Numidian | Touarus |
| Dinan | Obsidianum | Touche |
| Dove | Ophites | Turchineccio |
| Fior di Persico | Paragone | Tyrium |
| Giallo antico | Parian | Veined |
| Groek | Pentelic | White |
| Green | Phellense | Yellow |
| Herbosum | | |

Besides the publications referred to s. v., LITHOLOGY, writers who have treated on the marbles of the ancients are, ERNESTI: CARYOPHILUS, *De Marmoribus Antiquis*, 4to., 1738; WINCKELMANN; and DE LAUNAY, *Mineralogie des Anciens*. Notices of marbles, general and special, will also be found in the following publications: of the British Isles, *BUILDER Journal*, xviii, 397; of Ireland, HUNT in *Art Journal*, March 1856; B. iii, 273; x, 455; *Guide to the Dublin Society Museum*; CIVIL ENGINEER etc. *Journal*, 1845, viii, 83; *BUILDING NEWS Journal*, xiii, 672, xviii, 761; of England, B. vi, 627; xx, 526; of the United States of America, CIVIL ENGINEER, etc., *Journal*, iv, 266. TUTHILL, *History of Arch.*, 8vo., Phil., 1848, and in C.E., xi, 378. Of Tuscany and Modena, B. xviii, 397; of Italy, B. xx, 744, 923; of Algeria, B.N., 1856, ii, 418; 1868, xv, 673; of the Morea, BLOUET, *Exped. Scient.*, fol., 1836, pl. viii, etc., Ser. 2, Geol.: of France, VIRLOYS, *Dict.*, 1770; and RONDELET, *Art de Bâtir*, 4to., Paris, 1805-10. *Jurors reports* of the International Exhibition of 1851, and of 1862; and those of the Paris Exhibition 1867, B.N., xiv, 489.

To take port wine or other vegetable stains out of marble, the only successful mode of procedure is to rub it on both sides with sand and water so as to remove the polish; then to lay it exposed to the atmosphere in a bed of clean wet sand, from a quarter to half an inch thick, the sand to surround the marble up to its thickness, so as to be level with the upper surface. It is to be sluiced with water two or three times a day until the stains have quite disappeared, which will probably take ten or fifteen days: the marble is then to be repolished. White marble is so very delicate and so easily stained, that great care is requisite in the above process, that the article on which the sand is laid will not impart an additional stain; the best material is new stone of any sort, or new deal boards; C. H. Smith, in *BUILDER Journal*, 1850, viii, 585. An old recipe consists in adding to a bullock's gall, a gill of soap-lees, and half a gill of turpentine; these to be made into a paste with pipeclay, and applied to the marble for a few days. If on wiping it off the stains

are not removed, a second or third application will generally be sufficient.

Another recipe is to mix pumice stone, very finely powdered, into a paste with verjuice; let it stand for two hours; then with a sponge rub it over the marble, and allow it to dry; then wash it off with clean water, and dry with soft linen; *BUILDER Journal*, 1862, xx, 121.

MARBLE; ARTIFICIAL. Besides SCAGLIOLA, certain cements have had this term applied to them; as KEENE'S; MARTIN'S; PARIAN; D'HARCOURT'S. A "Composite Marble, or patent Intonaco," in a very high degree water and fire-proof, was put forward in 1844 for plastering purposes by firms at Manchester. Dr. E. Braun of Rome was in 1854 reported to have succeeded in the production of a material adapted to plastic purposes, very white, impervious to wet, and adapted for the most delicate objects, or for works of large size; *BUILDER Journal*, xii, 349. In 1865, Sainte Claire Deville, a chemist of France, discovered a new artificial marble and cement, noticed in *BUILDING NEWS Journal*, 1866, xiii, 41, which appears of some importance. A "new substitute for marble and scagliola" was advertised from about 1860 and is still worked at the "Patent Marble Works," No. 188 Great Portland-street, London. MAREZZO MARBLE, is another of these imitations.

MARBLE COLOUR. A term used in books of the eighteenth century in painting woodwork; what coloured marble was to be represented is not stated.

MARBLE DECORATION. Decoration with slabs of different coloured marbles was much used by the Romans, but it sank in the reign of Claudius (268-70) to the use of ordinary marble painted or stained. The mode of introducing colour in construction by means of various marbles, is described by STREET, *Brick and Marble Architecture*, 8vo., London, 1855, p. 278, "of two modes, the first, that practised at Bergamo, Cremona, and Como, in which the marble formed portion of the substance of the wall; and the second, that practised at Venice, the veneering of brick walls with thin layers or coats of marble." Details are given by him on pp. 125, 141, 146, and 171. The work at Venice is much referred to by RUSKIN, *Stones of Venice*, 8vo., Lond., 1851-53, ii, 74. WARING, *Arts connected with Architecture*, fol., London, 1859, gives, pl. 22 to 41, marble and enamel inlay of the twelfth, thirteenth, and fourteenth centuries; and quotes from RUMOHRE a contract, Sept. 1444, in the archives of the cathedral at Siena, for a memorial stone of this class; the receipt for the composition used in filling in the ornament is also given; *BUILDER Journal*, 1859, xvi, 21. A modern instance of similar work is exhibited in the "Marmor Homericum" by baron H. de Triqueti at the University College, Gower-street, put up 1865; *BUILDING NEWS Journal*, xii, 363; and in the similar works by him in the memorial chapel to the prince consort at Windsor. A new (1842) mode of ornamenting marbles by etching with acids deeply into them, and filling the cavity with hard coloured wax prepared so as to take a polish equal to the marble, is noticed in CIVIL ENGINEER, etc. *Journal*, v, 160. CRESY and TAYLOR, *Pisa*, fol., Lond., 1829, p. 26. It has long been known that white marble may be penetrated to the depth of a line by certain corrosive tinctures, which will give it the colours of other marbles.

INCISED WORK; INLAID WORK; INCRUSTATION; VENEER; WALL VEIL. *Illustrations*, s. v. Marble Pavement, 1861, pt. 1; Tessellated Pavement, 1848-49, pt. 1; and Inlaid Pavement, 1848-49, pt. 2.

MARBLER (late Lat. *marmorarius*), now called a statuary. The words will be found used 1183 at Durham as noted herein s. v. Lambertus; and 1339, 1361, s. v. Gibbon: 1457 John Bourde, executed the tomb in Beauchamp chapel, Warwick, and John Essex, with others, executed the images of mourners, and weepers, etc.; BRITTON, *Arch. Antiq.*, 4to., London, 1814, iv, p. 12. "Merbler" is used 1469-70 in CAMDEN SOCIETY, *Fabric Rolls of York Minster*, 8vo., Durham, 1859, p. 73; and "Marbler" is also noticed therein, 1491, s. v., p. 347.

MARBLING. The art of imitating real marbles by painted work. LEPSIUS, *Denkmaeler aus Aegypten*, fol., Berlin, 1849-59, shows Abth. II, pl. 19, an example executed at Gizeh during the fourth dynasty. In the thirteenth century in England, wooden and stone piers and arches were painted to imitate marble, as were those of the halls at Guildford and Ludgershall. TURNER and PARKER, *Domestic Arch.* 8vo., Oxford, 1851, p. 91; 246, etc. A picture of Fox, bishop of Winchester, at Oxford, painted early in the reign of Henry VIII, has a frame of the same age coloured in imitation of red marble with veins of green; WALPOLE, *Anecdotes*, 4to., Strawberry Hill, 1762, p. 55.

The tradition is that marbling and graining were introduced into England from France about 1782 by H. Holland at Carlton House. To imitate marbles with success and spirit, the painter must devote much time and attention to the art, and examine attentively large specimens of the real material. As few workmen were found to do this, it became necessary to prepare *papers* in imitation of the various marbles; these are sized and varnished to imitate the polish of real marble. The "process of imitating marbles" with fifteen specimens on paper, is explained in HIGGINS, *House Painter*, 4to., London, 1841, p. 161-74; and in MOXON, *Grainer's Guide*, fol., London, cir. 1836, as copied in *BUILDER Journal* 1842, i, p. 342. Marsden's (of London) papers for halls and staircases, were awarded a medal at the International Exhibition at Paris 1867. WIRSING, *Marmora et adfines aliquos Lapidis coloribus suis exprimi curavit* (Lat. et Germ.), gives 12 coloured plates of 72 varieties of marble, fol. Nuremberg, 1775. Such imitations have of late years been executed on stone and on enamelled slate to a high perfection.

The manufacture of "marbled paper," (which is not used for building purposes) is described in *BUILDER Journal*, 1865, xxiii, 912.

MARCELLINI (CARLO ANDREA), designed at Florence, the palazzo (Pucci later) S. Gallo, formerly the ospizio for pilgrims 1685; and the hospital and church of S. Giovanni d' Iddio, or di Dio, modernised 1735; FANTOZZI, *Guida*, 8vo., Florence, 1842: but the vestibule only of the hospital is given to him with the church, in GRANDJEAN et FAMIN, *Architecture Toscane*, fol., Paris, 1846, pl. 73.

MARCHAND (GUILLAUME), architecte du roi et colonel de la ville de Paris. For the *pont neuf*, B. Androuet du Cerceau made the model, at the price of fifty crowns and superintended the works, according to SAUVAT, *Histoire*, fol., Paris, 1724, i, 223, 232-5, who says that G. Marchand planned the bridge and its approaches, and commenced, as the builder, that bridge of which the first stone was laid 31 May 1578. Four piers were erected within the subsequent six months; but Marchand appears to have quitted, before all the piers were above water, the works which were continued vigorously during the years 1581-4, when the rue S. Louis was opened, but which were stopped on account of the political troubles 1591. Petit in 1597 or 99 resumed the work as builder and completed it 1604 with Marchand, who in 1614 made the pedestal on which his partner Franqueville erected the statue of Henri IV; JAILLOT, *Recherches sur Paris*, 8vo., Paris, 1772-5, i, 180; CALLET, *Vies*, 8vo., Paris, 1843, p. 111, secures to Marchand the credit of the fine cornice of this bridge. Marchand also designed for Henry IV (1589-1610) the new chateau of S. Germain en Laye, and also the new chateau at Monceaux or Mouceaux in Brie; BRICE, *Nouvelle Descr. de Paris*, 12mo., Paris, 1725, iv, 171, 174; DURAND *Parallèle*, fol., Paris, 1800, pl. 57. He died 1606 and was buried in the church of S. Gervais, at Paris. BERTY, *Les Grands Architectes*, 8vo., Paris, 1860, p. 106.

MARCHAND (ESTEBAN), a French engineer, who in the park of la Granja or S. Ildefonso, near Madrid, about 1719 for Philip V, laid out the ground, the hydraulic works, and the plans of the gardens, under T. Ardemans; DUSSEUX, *Les ARCH. PUB. SOC.*

Artistes Français, 8vo., Paris, 1856, p. 223. He continued 1732 the works begun 1727 by P. de Caro Idrogo in addition to the palace at Aranjuez; but dying 1733 he was succeeded by L. Brachelieu. He was the first master of V. Rodriguez. 66.

MARCHANT (JEAN), of Amboise, had worked at the chateau de Chambord, the design of which is attributed to Pierre Nepveu, called Trinquenau, of Blois 1526, who had worked at the chateau de Blois for Louis XII; DUSSEUX, *Les Artistes Français*, 8vo., Paris, 1856, p. 1v; PETIT DE LA SAUSSAYE, *Chambord*, fol., Chambord, 1837, p. 15, doubts that either Le Roux (1532-41) or Primaticcio (1532-70) designed that chateau, as usually stated.

MARCHESE (ANDREA and JACOPO), also called The Formigini, as belonging to Formigine in the duchy of Modena, were a father and son who flourished 1525-60, also as sculptors, at Bologna; they worked together so that there is great difficulty in assigning any work particularly to either. To ANDREA, however, is attributed the erection 1530 of the church of S. Bartolomeo di Porta Ravignana rebuilt 1653 by G. Natali, except the portico which was retained on account of the bassi-relievi in the piers: the capella Lombardi-Malvezzi in the church of S. Francesco; the palazzo Malvezzi-Campeggi; and the palazzo Fantuzzi or Elefantuzzi, afterwards Pedruzzi, in the strada S. Vitale; the staircase, however, is by P. Canali, but some critics restrict the unaided labours of Andrea to the decorations of the upper windows of that particular building. By these critics, the two jointly are also credited with the capitals of the façade of the palazzino (del Monte, later Angeletti, and since) Monari; the carvings in the parochial chapel at the church of SS. Vitale and Agricola; in the chapel of the Magi in the church of S. Martino Maggiore; and of the high altar in the church of the Misericordia.

To JACOPO alone remains the credit of a design for the façade of the church, which has been preserved in the offices belonging to the edifice, of S. Petronio. These, with minor works, are noted in ALBERTI, *Italia*, fol., Bologna, 1550, p. 323. Muzzi, *Annali*, 8vo., Bologna, 1840-4, vii, 356; VEDRIANI, *Raccolta*, 8vo., Modena, 1662, p. 59. 68. 93. 94.

MARCHESE. An error in TICOZZI, for CAGNOLA (LUIGI).

MARCHESI (ANTONIO), was brought from Naples to Civita Vecchia by pope Leo X (1513-22) to superintend the fortifications of that city; VASARI, *Lives*, 8vo., London, 1851, iv, 5, calls him MARCHISI. 36.

MARCHIONE, see AREZZO (MARCHIONE D').

MARCHIONE or MARCHIONNI (CARLO), designed 1765 the church of La Maddalena at Messina: and was probably the same Marchione who built the cappella del Prescipo in the basilica di Sta. Maria Maggiore at Rome. 11.

MARCHIROLO (BATTISTA), designed the palazzo del governo at Aquila, in the kingdom of Naples, before 1554, used after the death of Ottavio Farnese, duke of Parma, for the residence of his widow as governor. A portion was thrown down by an earthquake 1703, and not all rebuilt. MILIZIA gives the date 1573 of its erection. 3. 12.

MARCHISI (TOMMASO DE') 1744-50 magnificently enlarged the monastery of SS. Alessio e Bonifazio on the top of Mount Aventine at Rome, and almost entirely rebuilt its church; the plans are given in LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840-60, p. 336, pl. 150. 12.

MARCHISI (ANTONIO), see MARCHESI (A.).

MARCO (ANTONIO q., ? for qualificante) was 1477 *proto* or superintendent of the church of S. Zaccaria at Venice; SELVATICO, *Venezia*, 8vo., Venice, 1847, p. 199; quoting *Fiore di Venezia*, ii, 258; and CIGOGNA, *Inscrizione Veneziane*, 4to., Venice, 1824-53, ii, 106. TEMANZA attributes the building to Martino Lombardo 1456-1515.

MARCO. An Italian who built 1487-91 at Moscow the first stone mansion for Ivan III, his former residences having been of timber. It was called the "hewn palace" (*granatovitaya palata*), and was to be used for the reception of ambassadors,

etc. He had an assistant named Pietro Antonio; CIVIL ENGINEER, etc., *Journal*, xvii, 336.

MARCO DI PINO, see PINO (M. DI).

MARCO DA SIENA, see SIENA (M. DA).

MARCOJANO (FRA GIOVANNINO DA), born at Marcojano del Mugello, took about 1302 the habit of lay brother in the Dominican monastery of Sta. Maria Novella at Florence, where he must have assisted J. Talenti in building their church; and he was sent to Rome to work at S. Peter's. He died 16 April 1348. MARCHESI, *Lives*, 8vo., Dublin, 1852, i, 344.

MARCOS (ALONSO), constructed 1618-20 in the monastery of the SS. Trinidad at Madrid, built by G. Ordoñez on a design by J. de Valencia, the staircase which is mentioned as magnificent and equal to that in the Escorial. 66.

MARDO FIR TIMBER, is mentioned in an estimate in BUILDER'S DICTIONARY, 8vo., London 1834, i, s. v., Floor in Appendix.

MARÉCHALE, or MARESCHAL (FRANÇOIS), *archicharpentier*, together with Jean Vast the younger, probably erected 1560-68 a tower and spire of wood at Beauvais Cathedral, 479 ft. high, which was executed in order to eclipse the fame of the cupola of S. Peter's at Rome. The insecurity of the tower was so evident that five years after its completion the architect called in to report had but just time to warn the congregation, and it fell (30 April 1573) before he reached the bottom. WOLLEZ, *Description de la Cathédrale*, fol., Paris, 1838, p. 6. WHEWELL, *Architectural Notes*, 8vo., London, 1842, p. 259-60. DUSSEUX, *Les Artistes Français*, 8vo., Paris, 1856, p. lvi.

MAREZZO MARBLE. A factitious product, introduced about 1867 by Messrs. Cox and Wood, intended for interior decoration. Unlike scagliola, it is made of cement, but fibre being mixed into the material makes it strong, capable of receiving hard blows without being broken, and renders it more easily moved from place to place. Any sort of marble can be imitated and it can be applied to every variety of form. Slabs are fixed by bedding them on plaster of Paris and with cramps and dowels like marble; scagliola, on the contrary, is rendered on the wall as in plaster work. ART JOURNAL, May, 1868; BUILDING NEWS JOURNAL, 1868, xv, 226. The entrance hall of the Society of Arts in the Adelphi, lined with this material, is described in BUILDER JOURNAL, 1868, xxvi, 517.

Maretzo marble, a patent taken out by Mr. E. J. Bridell, is described in the BUILDER JOURNAL, 1862, xx, 594; it is perhaps the same as the above.

MARGARITONE, see AREZZO (M. D').

MARGARY'S PATENT PROCESS FOR PRESERVING TIMBER from the dry rot, taken out in 1837, thoroughly saturated it with a solution formed of one pound of sulphate of copper (blue vitriol) with eight gallons of water. For each inch in thickness of timber two days were required. Wood thus impregnated will not last longer in sea water than any other wood; but timber so treated will last longer in the soil than if either tarred or charred. Its application for the prevention of rot is useful where not exposed to the action of water, on account of the solubility of the salts. The proportions are sometimes stated as 1 to 4, and even 1 to 2.

All the timbers of the bridge over the Seine at Eauplet on the Rouen and Havre railway were steeped in this solution. BUILDER JOURNAL, 1843, i, 321; 1862, xx, 810. 1.

MARGIN. A space or border left to any work, as the blank edges around the type of a printed page of text. The term is applied to the 'gauge' or 'bare' of slating; BOND: and also to the border around the face of a stone, which is worked differently to it; DRAUGHT.

MARGOTE (RODRIGO DE), see RIBEIRO RADA (J. DE).

MARIA DE BELEM DE GRAN PARÁ (SANTA), or Pará as it is usually called, is a town in Brazil, founded 1615 by Francisco Caldeyra. It is situated on the rio do Pará, which is about seven miles wide. The houses are of stone, one and two stories in height, and are whitewashed. The cathedral is

large: the best edifice is the college of Jesuits now the residence of the bishop; a part of it is used as a college; the church contiguous to it is used as an hospital. There are also the governor's palace and the custom house. SPIX and MARTIUS, *Reise in Brasilien*; SMYTH and LOWE, *Journey from Lima to Pará*. 14.

MARIA DE FALLERI (SANTA), see CIVITA CASTELLANA; and LORENZO.

MARIE, designed 1663 the first bridge of timber erected in front of the archbishop's residence over the Saône at Lyon, in France; the pont de Tilsit now occupies its site. BREGHOT DU LUT, *Biographie Lyonnaise*, 8vo., Lyon, 1839, p. 180.

MARIGHELLA (FRANCESCO) designed 1505-8 the church of S. Giovanni Battista, at Ferrara.

MARIGOLD FLOWER. "The *καλχαί*, which were intended to be sculptured on the upper fascia of the epistylia, remain to this day plain; we should have been ignorant that they were to be formed into chrysanthema or marigolds, but for their appearing in a finished state in the doorway of the north portico." WILKINS, *Proslusiones*, 4to., London, 1837, p. 68, referring to the *Inscription* relating to the Erechtheum at Athens.

WHITTINGTON, *Survey*, 2nd ed., 8vo., London, 1811, p. 152, uses the term for the three round windows in the cathedral of Notre Dame at Paris: and BRITTON and PUGIN, *Public Buildings*, 8vo., London, 1828, ii, 163, when describing the round window in the south transept in Westminster Abbey, states that "the epithet Marigold is used as implying a window of more complicated tracery, and a greater variety of parts than that which is generally called the ROSE, or the S. CATHERINE-WHEEL." Details of this window are given in PUGIN, *Specimens*, 4to., London, 1823, ii. 52.

MARINE CEMENTS. The same as are made of HYDRAULIC LIME. CHATONEY and RIVOT, *Materials employed in Marine works*, a paper presented to the French Academy of Sciences, and abstracted in BUILDER JOURNAL, 1856, xiv, 643.

MARINE GLUE, see GLUE.

MARINELLI (FILIPPO), rebuilt the church of Sta. Anna di palazzo at Naples, where his other works must date about 1700. 95.

MARINE METAL. The name given to a patent taken out before 1834 by baron Wetterstedt; it is now better known as WETTERSTEDT'S PATENT METAL. The patent METALLIC CANVAS is a combination of this metal and canvas.

MARINE WORM. The effects produced by the *Teredo navalis*, the *Limnoria*, and the *Pholas*, on timber in sea water, are related in the *Minutes of Proceedings* of the Institution of Civil Engineers, vi, 54; ix, 23; 41-8; and xviii, 437; also in the CIVIL ENGINEER, etc., JOURNAL, 1850, xiii, 19.

MARINO (PIETRO DI), built at Naples about 1635 the church of Sta. Maria a Capella; about 1646 the church of the Carmelite monastery of Sta. Maria di Monte Santo; the church of S. Giorgio Maggiore, acquired 1447-53 by the Augustinians; and the church dedicated to the Assumption of the Virgin belonging to the ospedale di Sta. Maria della Pace. 95.

MARIONIS. The Latin name of HAMBURG, in Northern Germany.

MARISIBALLI. An exceedingly close-grained, hard, heavy wood, from the river Demerara, very plentiful, and chiefly used for spars. It will square from 13 to 14 ins., from 30 to 40 ft. long. 71.

MARITZBURG, see PIETER-MARITZBURG, in Southern Africa.

MARK. A monogram or symbol. A distinctive device or "trade mark," adopted by persons in trade from a very early period, and in all countries, whereby their work or goods could be identified by the owners or makers. The monogram or rebus had a similar effect. Merchants, ecclesiastics, and other persons of respectability, not entitled to bear arms, adopted "marks or notes of those trades and professions

which they used; as a tailor his shears, a cutler a knife, a sheerman his cloth shears, a mason his trowel, or the compass or square, and so of others. Merchants (for their more honour) might bear the first letters of their names and surnames, interlaced with a cross." FAVIN, *Le théâtre d'honneur*, 4to., Paris, 1623; translated fol., London, 1623, examples of which are given in the *Glossary of Terms used in British Heraldry*, 8vo., Oxford, 1847, p. 221: HUNT, *Tudor Arch.*, 4to., London, 1836, p. 53: *Builder Journal*, 1861, xix, 882: NORWICH AND NORFOLK ARCHÆOLOGICAL PAPERS, iii, 177. These marks are analogous to the custom of classic times when emblems of the trade were carved on the tombs of the workman.

In the building trades, a mark is found on carpenter's and on mason's work. In the "court book" of the Carpenter's Company, marks are seen dated 1569 and later. The mark of a wood carver, a branch or sprigs, in Ludlow church, is given in WRIGHT, *Essays*, 12mo., London, 1801, ii, 120; 127.

The subject of mason's marks and seals (*Fr. marques et écussons*) has been of late years much commented upon. One of the earliest in this country to collect examples from mediæval structures was GODWIN, *Certain marks discoverable in the stones of various buildings erected in the Middle Ages*, read 1841 and 1843, printed in the *Transactions* of the Society of Antiquaries, 4to., London, 1849, xxx, p. 113-20; and also *Something about Mason's marks in various Countries, in Sessional Papers* of the Royal Institute of British Architects, 1868-69, p. 135-43, giving an account of the pamphlet by J. P. N. DA SILVA, *Signification des Signes qu'on voit gravés sur les anciens Monuments du Portugal*, 4to., Lisbon, 1868. Those in Spanish buildings are given by STREET, *Gothic Architecture*, 8vo., Lond., 1865. A large collection from all countries has been given in the FREEMASON'S MAGAZINE and MASONIC MIRROR for 1862, p. 243, etc.; and 1861 (Eastern) ii, 229; (Ancient Egyptian) 1861, ii, 487. They are now generally supposed to distinguish the particular stone worked by the mason to whom that mark had been assigned.

In 1853 Professor Homeyer of Berlin printed an important notice on "House and Homestead Marks," and their extensive use in Northern Germany and Scandinavia, for the identification of churches, houses, homesteads, etc., with their appurtenances, whether moveables or fixtures, and also as the personal marks of their owners for the time being. The marks are generally composed of a few straight lines. Examples in peasant's houses at Prans near Dantzig, are given in the translation in ECCLESIOLOGIST *Journal*, xv, 155-7; with other notices of their use.

STIRGLITZ, *Altdeutschen Baukunst*, 4to. and fol., Leipzig, 1820, pl. 18. HEIDELOFF, *Kunste in Schwaben*, 4to., Stuttgart, 1845-53, p. 17, 44, 45, 50, pl. 13 and 16, and pl. iii b, in Supplement, fol. 1860. OTTE, *Handbuch der Kirchlichen Kunst Archaeologie*, 8vo., Leipzig, 1854, p. 169. HEIDELOFF, *Die Bauhütten*, 4to., Nuremberg, 1844. At Strasburg in DIDRON, *Annales Archaeologiques*, 4to., Paris, 1848, viii, 148, 185; others in v, 272. At Strasburg and Vienna, *Builder Journal*, xxi, 681, 718. BOEBLINGER; ETTLINGER.

Marks found at the palace at Al Hather and other Sassanian buildings, MS. paper, p. 28, read 1846, by A. H. Layard at the Royal Institute of British Architects. Those at Pompeii, noted in GELL, *Results*, 4to., London, 1832, ii, 122; and in the Society for the Diffusion of Useful Knowledge, *Pompeii*, 8vo., London, 1831, i, 65.

RAMÉE, *Manuel de l'histoire*, 8vo., Paris, 1843, ii, 287. Those at the château de Tournebut (end of sixteenth century), are described in DE CAUMONT, *Statistique Monumentale de l'Alsace*, 8vo., Paris, 1848, p. 381. SUISSE ROMANDE HISTORIC SOCIETY held at Lausanne, 9 June 1870.

CHALMERS, *Use of Mason's Marks in Scotland*, read 1850 at Society of Antiquaries, *Archæologia*, 1852, xxxiv, 33, gives examples used in the S. Ninian's lodge at Brechin from 1717 to 1847 inclusive. PAGAN, *Glasgow*, 8vo., Glasgow, 1851, i, 152; WILSON, *Prehistoric Annals of Scotland*, 8vo., Edinb.,

1851, p. 640-3; 2nd edit., 1863; *Transactions of the Society of Antiquaries of Scotland*, 4to., Edinb., 1792-1828, ii, 439; LAURIE, *Freemasonry*, etc., 8vo., Edinburgh, 1859, p. 451; KERR, *Notes on Mason's Marks preserved among the operative masons of Scotland*; and LAING, *Marks at Holyrood Chapel*, were communicated to the ARCHÆOLOGICAL INSTITUTE, 1856, xiii, 400.

Marks and secret language in Ireland, *Builder Journal*, 1858, xvi, 547; and DUBLIN *Builder Journal*, 1860, ii, 279; both from *Proceedings* of the Kilkenny Archæological Society, 1858, No. 15, new series, ii, p. 67.

Marks on wrought stone in Maidstone church, Kent, in WEALE, *Quarterly Papers on Architecture*, 4to., Lond., 1844-5, p. 22. In the crypt at York cathedral, BROWNE *History*, 4to., Lond., 1838-47, p. 12. At Leeds Priory, Kent, in *Journal of the ARCHÆOLOGICAL ASSOCIATION*, 8vo., London, 1847, ii, 95. The ARCHÆOLOGICAL *Journal*, 1850, vii, 124, gives *Runic Inscriptions* very similar to mason's marks; vii, 62, marks on Catterick bridge, Yorkshire; and p. 390, from piers on New Shoreham church, Sussex; references by GODWIN at British Archæological Association, *Proceedings* at Canterbury, 8vo., 1845, p. 257-8. At Croyland, in *Reports and Papers of the Associated Architectural Societies*, 1861, p. 25. Notices by STREET, at Clermont in Auvergne, in *Sessional Papers* of the Royal Institute of British Architects, 1860-61, p. 114, 120; and also by PAPWORTH, in those for 1861-62, p. 52. OLIVER, *Landmarks*, 8vo., London, 1845-46, i, 425-8.

Other general notices are given in *Builder Journal*, i, 365, 423; vi, 351; vii, 205; xiii, 560; at Roche abbey, xviii, 420; *Geometrical and other symbols*, xxi, 245, 273, 402, 493. FREEMASON'S QUARTERLY MAGAZINE, 1853, with cuts.

MARK, OR BRAND, ON DEALS AND TIMBER. A careful detailed description, with explanations, is given in the *BUILDING NEWS Journal*, 1867, xiv, 899; and xv, 23, *et seq.* CROWN TIMBER.

MARKET. A public place used at a fixed time for the meeting of buyers and sellers. It is generally appointed to be held once, twice, or three times a week, for the current supply of commodities, mostly of provisions. A large market held once or twice a year is called a fair; and, according to Lord Coke, a large fair held once a year is a mart. When the whole bulk of the articles to be sold is brought into the market and exposed for sale, the market is called a *pitched* market; when only a small portion is brought, to show the quality of the whole, it is called a *sample* market. "The Markets and Fairs Clauses Act, 1847."

14.

The several varieties of markets are described, *s. v.* BAZAAR; CATTLE MARKET; CHEESE MARKET; FISH MARKET; CORN MARKET OR EXCHANGE; MEAT MARKET; VEGETABLE MARKET; WINE MARKET OR CELLAR; WOOL, and silk, and cloth HALL; ARATTOIR (*Detached Essay*); SLAUGHTER HOUSE.

Illustrations of cattlemarkets (*Ger. Viehmarkt*) are given in HENNICK, *Bericht über Schlachthäuser und Viehmarkte*, fol., Berlin, 1866, being those at Hamburg, London, Lyon, Poissy, Newcastle, and Glasgow.

Illustrations of markets will be found in BRUYÈRE, *Études relatives à l'art des constructions*, fol., Paris, 1823-28, pt. vi. DALY, *Revue Générale*, 4to., Paris, 1854, xii, pl. 2-5; Parallèle des projets de Halles Centrales pour Paris. BALTARD AND CALLET, *Monographie des Halles Centrales de Paris*, fol., Paris, 1864: plan and elevation in NOUVELLES ANNALES DE LA CONSTRUCTION, fol., Paris, 1856, ii, pl. 1-2. VERDIER AND CATTOIS, *Architecture au Moyen Age*, 4to., Paris, 1852-7, ii, 167. *BAUZEITUNG Journal* (S. Germain, Magdalen, and Halle au Blé, at Paris), 1838, Ser. 1, pl. 184-8; and (Hungerford with details) pl. 216-253. NORMAND, *Paris Moderne* (S. Martin), 4to., Liège, 1843-46, pt. 2, pl. 67. GAILHARDET, *L'Architecture du Vme. Siècle*, etc., 4to., Paris, 1852, (Ypres), iii; iv. Notices with dimensions and costs of various English markets are given in CIVIL ENGINEER, etc., *Journal*, 1843, vi,

285; 1845, viii, 257; and 1854, xvii, 88; and *BUILDER Journal*, 1854, xii, 408.

MARKET CROSS. A structure, generally of stone but sometimes of timber, of various shapes and sizes, erected in a market place, usually for sheltering a number of persons while promoting traffic, as described *s. v.* Cross (p. 166). The laws and history of fairs and markets are fully detailed in published statutes and law books; but the origin, specific appropriation, and peculiarities of those buildings popularly known by the name of market crosses, have not been discovered. Markets were originally chiefly held on Sundays and holidays, but in 1677 they were prohibited; and for the convenience of dealers and others they were held in the churchyards, but in 1285 they were forbidden. MILNER, *Winchester*, 4to., London, 1809, ii, 183, states that "the general intent of market crosses was to excite public homage to the Christian religion, and to inspire men with a sense of morality and piety amidst the ordinary transactions of life." Examples still remain at † Salisbury, † Malmesbury, * Winchester, * Leighton Buzzard, * Cheddar, † Chichester, * Stourhead, * Gloucester, * Coventry, † Whitefriars near Hereford, Castle Combe, Bristol; Somerton (*BUILDER Journal*, i, 326), Wainfleet, Lincolnshire. The cross at * Glastonbury was pulled down soon after 1802. Those marked * are described and illustrated in BRITTON, *Architectural Antiquities*, 4to., Lond., 1807; and those marked † are illustrated and described by him with others in ARCHAEOLOGICAL INSTITUTE, Meeting at Salisbury, 8vo., London, 1851, p. 304-14.

The market crosses in Scotland, as at Edinburgh, Aberdeen, Perth, Alloa, Peebles, Melrose, Ayr, Foulis, Dull, Scone, Lochmaben, Minniehive, Turrieff, Old Rain or Rayne, Macduff, Glasgow, Dundee, Rutherglen, Wigton, Galashiels, and others, are noticed in *BUILDER Journal*, 1866, xxiv, 185, 246, 272, 322.

MARKET HOUSE. A building in a market place, generally used by its frequenters for shelter from inclement weather. Most of these old buildings were formed of timber, open at the sides, being supported by oak pillars. Examples at Leominster, Hereford (sold 1861), and other places, are illustrated in CLAYTON, *Ancient Timber Edifices*, fol., London, 1846; some having been erected by John ABEL as stated *s. v.* The old timber one at Ashburton, Devonshire, is given in *Illustrations*, 1867, pt. 1, and is described in *BUILDER Journal*, 1846, iv, 502; that at Llanidloes was to be sold in 1866: that at Rothwell or Rowell, Northamptonshire, erected 1577, is given in *Illustrations*, 1867, pt. 1, which plate also exhibits the timber market house at Dunster in Somersetshire. The edifice at Dorchester, by B. Ferrey, is given in *ARCHITECT Journal*, 1849, i, 349. A market hall at Voslau near Vienna, by L. Foerster, is given in *CIVIL ENGINEER*, etc., *Journal*, 1854, xvii, 161. An upper room was, and is, often used as the town hall.

The term is sometimes applied to the building containing a market chiefly for meat, vegetables, cheese, etc., such as exist in most of the towns in Great Britain and Ireland. One combined with an Institution, at New Swindon, 1854, by E. Roberts, is given in *BUILDER Journal*, xii, 346. The market at Blackburn by T. Flanagan; and one of corrugated iron for S. Fernando, are given in *PRACTICAL MECHANIC's Journal*, 4to., Glasgow, 1848-49, pp. 156, 207, 224.

MARKFIELD GRANITE. This material is obtained from quarries at Markfield, in Leicestershire. It is a syenite; and is chiefly used for paving and macadamising carriage roads. It has greater specific gravity and is harder than Mount Sorrel granite, therefore it cannot be economically used for tooled masonry, but locally, it is much used for rubble and hammer-dressed walling.

R. R. R.

MARL. A mixture of calcareous and argillaceous earth is commonly called marl. In Norfolk soft chalk used on the lands, and in Worcestershire and Somersetshire red clays, are

so termed. In geology, there is recognised the red marl, the black marl at the base of the lias, the chalk marl, and the freshwater marls of Headon Hill in the Isle of Wight. The term has been considered too vague for scientific description. 14.

Marl is found at various depths under the soil, and is extensively used for the improvement of land; when chalk prevails in it, it is beneficial for clays, when clay, for sands. The distinct sorts are, the clay marl, the shell marl, the slate marl, and the stone marl.

Chalk present in a clayey soil from 5 to 20 per cent. constitutes a marl; sandy, loamy, or clayed, according to the proportion: more than 20 per cent. forms a calcareous soil; BRANDE, *Agricultural Chemistry*, in *CIVIL ENGINEER*, etc., *Journal*, 1844, vii, 14, 110.

Great Marlow in Buckinghamshire is called in the Doomsday Survey *Merlaw*, a name, says CAMDEN, derived from the chalk commonly called 'marle' found in this neighbourhood.

"He that marls sand may buy land,
He that marls moss shall have no loss,
He that marls clay flings all away."

is a jingle quoted as an old saying in EVANS AND RUFFY'S *Farmer's Journal*, 3 May 1819.

At Ancaster in Lincolnshire a Roman kiln was discovered June 1864 the lower courses of which were formed of marl stone abounding with fossils, such as is now found in the adjacent parish of Barkstone; they appear to have used this compact crystalline rock as well adapted to exposure to a continued high temperature; ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., Lincoln, 1865, viii, pt. 1, p. xi.

The hard marls on the coal measures, new red sandstone, and blue lias formations, supply the material for the blue bricks of Staffordshire, and the fire bricks of Stourbridge. They require thorough grinding; CHAMBERLAIN, in *Society of Arts Journal*, 1856, and *BUILDER Journal*, 1856, xiv, 443. Clay, in *Memoirs of the Geological Survey of Great Britain*; Mineral Statistics, pt. 2 for 1858, edited by R. HUNT, 8vo., London, 1860, p. 18, et seq. CLAY.

MARL or MALM BRICK, see BRICK (Manufacture of), p. 138.

MARLEE. A very heavy brown wood of the Malabar forests. 71.

MARLIANO (GIOVANNI), see MERLIANO (G.)

MARMORA or MARMARA. The island of this name, the ancient Proconnesus (the Turkish Marmar Adassay), supplied the Greeks with marble for their sarcophagi. Its quarries of coarse greyish marble still furnish Constantinople with a great quantity in slabs and blocks, for the pavement of mosques and baths, and for tombstones; WALPOLE, *Memoirs*, 4to., London, 1817, p. 87; who also notices this material as a white granulated species with greyish stripes, used for fountains, baths, and vases.

MARMORARIUS. The Latin name given to those who worked in marble. MARBLER. 5.

MARMORATUM OPUS. The albarium or coat of fine stuff made of calcined gypsum mixed with pulverised stone, or, for the finest work, with pounded marble, used by the ancient Romans, as mentioned by VARRO. 1. 6.

MARNACHENE, in Armenia. The monastery, founded 988 and finished 1029, offers one of the best specimens of that style of Armenian architecture which may be called BYZANTINE-PERSIC.

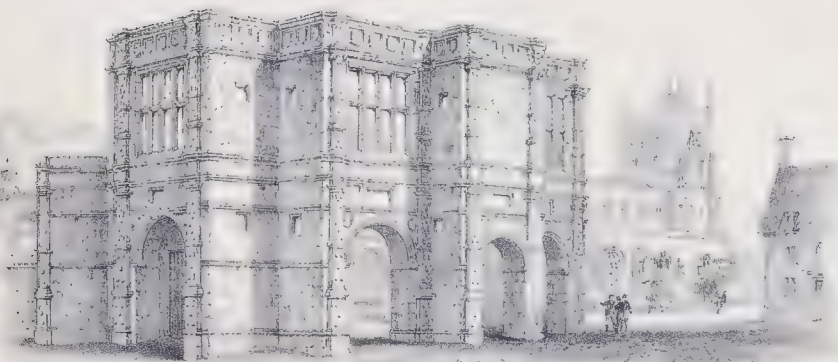
MARNE (. . . DE), inspecteur des Rigoles de Versailles, designed the hôpital de la charité for M. le Dauphin near the château de Clagny at Versailles, as stated in BLONDEL, *Arch. Franc.*, fol., Paris, 1756, i, 101.

MARNOTTE (PIERRE), was born 1797 at Dijon. He studied under Poyet, afterwards under A. Leclerc and Penchaud, and then established himself at Besançon; where, appointed 1823 architect to the town, he restored the Roman triumphal arch called the porte Noire, and built two churches

MARKET HOUSE



ASHBURTON Devonshire



ROTHWELL (or RUWELL, Northamptonshire)



Fig 3 DUNSTER. Somersetshire

Figs 1 & 3. F. Ashworth

Lithographed for the Society by Kell Bros Sept 1868



in the department du Doubs. His approved design for the corn market at Besançon was 1831 not yet executed. 110.

MAROCCHO, commonly written Morocco (the Arabic Marakasch). The capital city of the empire of the same name in the north-west portion of Africa, and founded 1086. It is nearly six miles in circuit, surrounded by a strongly built machicolated wall of *tappia* work (which is composed of lime mixed with earth and beaten in a case or frame) 30 ft. high with foundations of stone; the wall has square towers at every fifty paces, and eleven gates: within it are large gardens and open areas of from 20 to 30 acres. The streets are narrow, irregular, and unpaved; in many cases connected across by arches and gates. The houses are mostly built of *tappia* or *tabby*, but some are of stone; they are generally of one story, flat roofed, the side towards the street being plain and whitewashed; here and there a narrow unglazed opening for a window, and the apartments fronting a court. There are ruins of aqueducts in the vicinity, some of them 20 miles long. The city has been long hastening to decay, and is now nearly half in ruins. There are several open market places; a covered bazaar; and nineteen mosques, of which six are noted for their size and architecture; the "Kootsabee" is said to have been designed by GEYER, Guever, Hever, or Jaber, (who commenced the Giralda at Seville about 1000, or completed it 1196); its tower is supposed to be finished with four gilt balls of diminishing magnitude; BUILDERS *Journal*, 1863, xxi, 346; its solid construction is described by JACKSON. CONDE, *Domination of the Arabs*, 8vo., London, 1854, ii, 379, mentions the building of a great mosque with its lofty tower by king Aly, 1126, and rebuilt 1146-8 (pp. 455 and 465). The palace on the south side comprises an area of about 4500 ft. long by 1800 ft. wide: near it is El Millah, the Jews' quarter, a walled inclosure of 1½ miles in circuit, nearly one half of which is in ruins, and very filthy. There are several large cemeteries outside the walls, one contains over 100 acres. CHÉNIER, *Recherches sur les Maures et l'histoire de Maroc*, 3 vols. 8vo., Paris, 1787. JACKSON, *Account of the Empire*, 4to., London, 1809; 1811; 3rd edit. 1814. DRUMMOND HAY, *Journal of an Expedition*, 8vo., London, 1848. 50.

MARONE. One of a class of impure colours, being composed of black and red, black and purple, or black and russet, or any other pigment in which red predominates.

MARONE LAKE. A preparation of madder of great depth, transparency, and durability of colour; it works well in water, glazed and dries in oil; and is in all respects a good pigment, but it is not much used; WEALDE, *Dict.*

MAROOOTH. A whitey brown coloured wood, of Tinnevely, in the East Indies, used for building in general. 71.

MAROSCELLI (PAOLO), designed 1642 the palazzo Madama, in the piazza Madama at Rome, for the grand duke of Tuscany; the plan and elevation are given in FERRERIO, *Palazzi*, fol., Rome, cir. 1655. MARUCCELLI (P.) 12.

MAROT (JEAN), was born about 1630 at Paris. He is said to have given the designs for the hôtel de Pussort (*Les Délices de Paris*, pl. 122), of which only the entrance gate in the rue S. Honoré exists; it is now the hôtel de Noailles, and was rebuilt by L'Assurance, BLONDEL, *Cours*, 8vo., Paris, 1772, iii, 114: the hôtel for Monsieur le duc de Montemart, rue S. Guillaume, otherwise des Rosiers, now occupied by the comtesse de Pont-Chartrain, BLONDEL, *Arch. Franç.*, fol., Paris, 1752; i, 294, pl. 6 and 7: the façade of the église des Feuillantines in the faubourg S. Jacques (BLONDEL, ii, 73): the château de Lavardin, dans le Maine: and the château de Mouceaux, perhaps only a project; they are also illustrated in his first publication.

These edifices obtained for him the title of architect to the king; his clever design for the chief façade of the Louvre is given in BLONDEL, 1756, iv, 53; and in BLONDEL, *Cours*, 8vo., Paris, 1772, iii, 437, pl. 67. He laid out the gardens and its works, at the château de Maisons designed by F. Mansart, which have been engraved.

ARCH. PUB. SOC.

With his son DANIEL he engraved and published the chief monuments, ancient and modern, in Paris and in France; many plates of fine works of architecture, amongst others the French translations of Vignola, Palladio, and Scamozzi, and worked on the *Grand Cabinet du Roi*. He engraved *L'Architecture Française, ou recueil des plans, etc., bâtis dans Paris et aux environs*, fol. n. d. (known as "Le Grand Marot," another edition 1727-51), which also contains 17 plates of the antiquities at Baalbec; 10 plates of designs for triumphal arches; 2 pl. of ceilings; and a grotto: *Recueil des plans, etc., des plusieurs châteaux, églises, sépultures, grottes, et hostels, bâtis dans Paris et aux environs*, small fol., Paris, n. d. (known as "Le Petit Marot," 134 pl.; or 125 pl.; 1674; 1764), which also contains some designs for churches, etc., and is sometimes called *Petit Œuvre d'Architecture*, 200 pl., fol., Paris, 1674. He also appears to have published *Le magnifique château du duc de Richelieu*, 4to., Paris (1660) 1674, 18 plates; *Le château de Madrid*, fol.: *Le château du Louvre*, 1676-78, fol.: *Recueil de plusieurs Portes des principaux hostels et maisons de Paris; Autels des Eglises*, 16 pl., fol. Paris (1680); and *Cheminées, plafons, manteau de cheminée, alcoves, cheminées avec leur ornemens ou placards, vases, diverses pièces modernes, etc.*, all in parts, fol., Paris (cir. 1680). Some plates of his decorations are given in ADAMS, *Décorations Intérieures*, fol., Paris, 1861-4. J. B. Broebes was a pupil. He died at Paris 13 or 14 December, 1679. 3. 5. 112.

MAROT (DANIEL), born about 1650 at Paris, was a son of JEAN, whom he assisted in his publications. Upon the revocation of the edict of Nantes 1685, he went to Holland, and was appointed architect to prince William of Orange, whom he followed, 1688, to England; his works in that country are not known. He is said to have returned about 1702; but he laid out the gardens and designed the fountains for the king's palace at Loo in Holland, designed by De Marais 1690-97; HARRIS, *Description*, 4to., London, 1699, p. 47: WALPOLE, *Anecdotes*, 4to. 1765, iii, 157, calls Marot the surveyor of the building. The hôtel de Wassenaar, at the Hague, afterwards inhabited by the king, is attributed to him. He published *Recueil d'Architecture et d'Ornemens*, fol., Amsterdam, 1712, which may consist of the hundred or more plates of subjects published separately about 1690-1701, as named in the catalogue of the British Museum. The volume gives apartments and vases at Loo; garden works at Voorst, in Holland; a fine carriage for the king (pl. 115), docks, etc., tomb of Cohorn in the church of Wickel in Friseland, engraved 1703; and a design for the tomb of the duke of Portland "qui se doit ériger a Roon" near Rotterdam, with many other inventions. All the designs show the French taste in ornament; DUSSEUX, *Les Artistes Français*, 8vo., Paris, 1856, cxxxiii; who p. 253, states he designed the audience hall at the Hague, of which an engraving exists by Marot with figures representing the assembly of the States General. He died at the Hague after 1712. BLONDEL, *Architecture Française*, fol., Paris, 1752, ii, 73. 112.

MAROUFLAGE. The name of a method of painting practised (1862) in France. The basis consists of a strong canvas rendered impermeable by the infallible process greatly improved in some respects by M. Haro, the canvas as at present prepared presenting an excellent surface for painting, and thoroughly saving the work from injury by damp. This canvas when properly prepared is in the first instance sufficiently elastic to adapt itself with equal facility to a concave or convex surface as to a flat one. A very important advantage of the style is that, while *in situ* it has the appearance of being the real surface of the solid wall; and in case of necessity it can be peeled off and removed without the slightest injury. The ceiling painted by Ingres in the hôtel de ville at Paris; the paintings by Delacroix at the church of S. Sulpice in the Faubourg S. Germain, are executed on this material, which can be used for distemper colours in the manner of fresco, or for oil. A still more recent improvement in this process has been

effected by P. Balze, which effectually removes a few trifling inconveniences found in actual practice to occur in the marouflage system. The brothers Balze executed the copies from the works of Raphael on the walls of S. Geneviève. It is supposed that the new works by Lehman and by Balze in the dome of the transept, and other renovated parts of the church of S. Roch in Paris, were executed on this system; *BUILDER Journal*, 1862, xx, 707.

MAROUFLER is the French verb for the act of fixing a cloth upon wood or plastering, with glue or thick paint, or with a composition of Greek pitch and wax, being the usual preparation of concave surfaces for the reception of decorations or pictures painted in oil colours. 5.

MARPACH (ALESSANDRO DE). This name occurs under the date 11 Oct., 1483, in the list of those who were consulted upon the works at Milan cathedral; FRANCHETTI, *Storia*, 4to., Milan, 1821, p. 143.

MARQUAND (JOHN), was a surveyor in the office of Woods, Forests, and Land Revenue, London, up to 1809, when he was succeeded by Thomas Chawner.

CHARLES MARQUAND, published *Remarks on the different construction of Bridges, and improvements to secure their foundations on the different soils where they are intended to be built, which hitherto seems to have been a thing not sufficiently considered*, 4to., London, 1749.

MARQUESE, or MARQUISE, MARBLE, is obtained from quarries near Boulogne-sur-mer. The Napoleon column near that town is formed of it, as noticed in the article s. v. This material has probably not been used in England.

MARQUET (JAYME), was patronized at Paris by the duke of Alba, who took him to Madrid to regulate the paving of the streets. He became royal architect, and 29 March 1759, honorary director of the royal academy of S. Fernando. He was instructed 15 May, 1758, to erect the *commun*, with stables, etc., for the queen dowager's household at Aranjuez; he aligned the streets of that residence; designed the theatres at the palaces of the Pardo about 1759, the Escorial, and Aranjuez; and at the latter place designed several mansions and public buildings. But the work, which made him most known in Spain, was (1768) the casa de correos, or post office at the Puerta del Sol, on a design preferred to one by V. Rodriguez; it is said by STIRLING, *Annals*, 8vo., London, 1848, p. 1174, to be his only work in Spain, and very bad; (the adjoining casa de postas was a later work by J. P. Arnal). He died 23 Nov., 1782. 65. 66.

MARQUETRY. (It. *intarsiatura* and *tarsia*; Sp. *ataracea*; Fr. *marquetterie*; Ger. *ingelegte-arbeit*). Inlaid work, consisting of thin plates of ivory or of hard and precious woods, of different colours, fixed upon a framed and paneled ground, to represent ornaments, figures, flowers, etc., usually employed for tables, panels, boxes, and such like articles in contradistinction to the PARQUETRY used for floors. The outline of the decoration is sometimes marked by silver, tin, copper, or ivory, lines let into grooves. There is a variety, consisting entirely of plates of copper cut to the required outline, chased, and fixed upon a ground of tin or wood. The earliest examples are probably the ivory boxes ornamented with various coloured woods, chiefly manufactured at Venice during the fourteenth century; towards the close of which, or at the beginning of the fifteenth century, marquetry is found applied as an ornamental art by itself, and developed on large surfaces. The earliest artist in this work mentioned by VASARI is G. da Majano (1432-90). WARING, *Arts connected with Architecture in Tuscany*, read at the Royal Institute of British Architects. *Sessional Papers*, 1857-8, p. 25-6. WARING, *Arts, etc.*, fol., Lond., 1859. WYATT, *Industrial Arts of the XIX century*, fol., London, 1851-2, and his *Report to the Board of Trade on "Furniture and Decoration,"* at the Paris Exhibition of 1856. CRACE, *Application of Art to Manufacture*, in *BUILDER Journal*, 1859, xvii, 114, quoting his *Report* for class xxvi. of the

Exhibition of 1851, *Jurors' Reports*, p. 544. "Marquetry and Buhl," in *BUILDING NEWS Journal*, 1856, ii, 825. LAWFORD, *Cabinet of Marquetry, Buhl, and Inlaid Woods*, 20 coloured plates, 4to., London, cir. 1855. The most celebrated inlayers of modern times were Jean Macé, of Blois, and A. C. Boule (Buhl) and his son, of Paris. FLORENTINE MOSAIC; INLAID WORK; INTARSIATURA; TARSIA. 5.

According to a remark in HUNT, *Tudor Architecture*, 4to., London, 1836, p. 100, "carving and inlaying of woods had become pretty general at the latter end of the sixteenth century. At Hardwick, in Derbyshire (1570) the wood-work in several of the principal apartments is oak, inlaid with ebony ornaments on the panels and stiles. The doors and shutters of Mary, queen of Scots' room, as it is called, are framed in panels of light wood, inlaid with profiles of the Cæsars and other enrichments—the stiles of darker coloured oak."

MARRAVERI. A darkish wood of Canara in the East Indies. It is heavy, and used for beams and posts. 71.

MARRON (JUAN), of Orea in Castile, restored 1587 the gothic collegiate church at Daroca in Aragon, adding the portal of a Corinthian order. 66.

MARS. An ancient Roman god, who was at an early period identified by the Romans with the Greek Ares, the god delighting in bloody war, although there are numerous indications that the Italian Mars was originally a divinity of a very different nature. Next to Jupiter, Mars enjoyed the highest honours at Rome. A very ancient sanctuary was dedicated to him on the Quirinal hill, near the temple of Dios Fidius, from which he derived his surname of Quirinus, and hence was regarded as the father of the Roman people. The rites of his worship all point to victory. The warlike Mars was called Gradius, as the rustic god was called Silvanus, while in his relation to the state he was called Quirinus. The woodpecker (*picus*) and the wolf were sacred to Mars, and together with the horse were his favourite sacrifices. Numerous temples were dedicated to him at Rome, the most important of which was outside the porta Capena on the Appian road; and that of Mars Ultor, which was built by Augustus in the Forum. A supposed temple to Mars exists at Isernodurum, now Isernore, in the department of Ain in France. He is always represented with his usual attributes, the helmet and spear. 6. 59.

VITREVIUS suggests as among the canons of art that the temple of Mars should be of the Doric Order (i. 2), and placed out of the city in the neighbouring country (i. 7): the temple at Halicarnassus with its colossal statue, is mentioned by him, ii, 8.

MARSA SOUSAHI. The modern Arabic name for the ancient APOLLONIA in Cyrenaica, in Africa.

MARS BROWN, or *brun de Mars*, is a brown ochre. 9.

MARSH or MARCH (. . .), was born in Lincolnshire. VERTUE in WALPOLE, *Anecdotes*, 8vo., London, edit. 1862, p. 559, states he designed additional buildings at Bolsover, Nottinghamshire, for William duke of Newcastle, erected after the Restoration; the gallery was 220 ft. long and 28 ft. wide; the works were stopped: the design has been attributed to J. Smithson. Marsh was also the reputed architect of Nottingham castle, began 1674, an important work of the period, built by the same nobleman, and the shell completed in 1679 after his death; Smithson may also have designed this building: GENTLEMAN'S MAGAZINE, 1831, ci, pt. 2, p. 394. A plan and four elevations of it were in the possession of the late C. R. Cockerell, R.A., which probably have not been published.

MARNEILLE (Lat. Massilia, founded b.c. 578 by the Phœcean exiles from Asia Minor; Ital. Massiglia; Span. Marsella; Eng. Marseilles.) The capital of the department des Bouches du Rhône, in France, situated on the Mediterranean. It is the see of a bishop. Next to Paris no town in France has been more improved since 1853 by the creation of new and wide streets, with houses proportioned in height to the positions

they occupy; new quarters, harbours, and buildings. In 1865-66 an Imperial Land Company was formed for further extensions and improvements; *BUILDER Journal*, 3 Mar. 1866, p. xiii. The city has very few houses built in flats, they are mostly separate dwellings as in England. It is surrounded by hills, speckled over with about 6000 white country houses called *Bastides*, small residences, some handsome and surrounded by gardens, but the greater part standing in mere bare enclosures between four walls. The cafés equal even those of Paris in splendour; the café de l'Europe, designed partly in the style of the Alhambra, cost £16,000. The baths are situated about a mile and a half distant on the road to Aix; and larger ones on the bay des Catalans, behind the marine imperial villa built 1856-62 for the emperor by Lefuel, or by Vatrecher (1858, who built that at Biarritz), the outer facing is of marble from Peyreguiens near Aix; *BUILDING NEWS Journal*, iv, 436. The stupendous canal affording a constant supply of water to the city, from the river Durance near Pertuis, is gradually altering the aspect of the country round the town, by the irrigation which it furnishes. It was designed by Montricher; the first stone was laid 17 September 1842, it traverses about 60 miles; *PRACTICAL MECHANIC'S Journal*, 4to., Glasgow, 1848, i, 79, which puts the estimated cost at £880,000; the celebrated aqueduct of Roquefavour, (which may be reached in two hours by taking the Aix branch of the railway from the Roguac Junction station) is described s. v. Aqueduct in *Detached Essays*; Institution of Civil Engineers, *Proceedings*, 1855; *BUILDER Journal*, xiii, 45, 53; and *CIVIL ENGINEER*, etc., *Journal*, xviii, 65. Among the fountains is one surmounted by a bust of Homer, dating 1803; and the fontaine Beauveau. The statues consist of one to bishop Belzunce who assisted in the plague of 1720; with another to Puget the architect, in front of the exchange. The porte d'Aix is a triumphal arch erected 1823. The lazaretto erected after 1720, once famed as the largest and best regulated quarantine establishment in Europe, has been removed and its site nearly covered with docks and buildings; the plan is preserved in HOWARD, *Account*, 4to. Warrington, 1739.

The old port or harbour, an oblong basin about 1100 yards long by 350 yards broad, extends into the heart of the town. The new harbour consists of a series of docks or *bassins* in course of construction 1842-53, under Montricher, engineer-in-chief, Pascal, engineer, and Busche, inspector-general; *NOUVELLES ANNALES DE LA CONSTRUCTION*, fol., Paris, 1855, pp. 33 and 34; they are nearly a mile in length by a water width of 450 yards: the warehouses, 400 yards long, 6 stories high with arched cellars, costing a million sterling, are said to be the best of the sort in Europe; they were opened Nov. 1862; and were described by T. HAWTHORN at the Institution of Civil Engineers, 24 Jan. 1865, *Proceedings*, xxiv, 144-83, with plates; an abstract is given in *CIVIL ENGINEER*, and in *BUILDING NEWS, Journals*. The bassin Imperial beyond is in progress. Warehouses near Catalan Bay, given in *ALLGEMEINE BAUZEITUNG*, 1841, pl. 407-9, were not executed. The mouth of the old port 105 yards across, is defended by two forts; on the north by the old castle and tower (LIGHTHOUSE) of S. Jean, built in the 15th century; on the south, by the fort S. Nicholas, much strengthened since 1860; it was founded by Louis XIV. The château d'If, built for Francis I, on an island, is given in *LA BORDE, France*, fol., Paris, 1816, pl. 181.

The new cathedral dedicated to Notre Dame de la Major (the first stone was laid 26 September 1852), commenced 1855, was designed by L. Vaudoyer; it is in the Byzantine style, similar to the public buildings of Genoa, the stones in courses, white, grey, and black; in 1869 it was still far from completion; BOUSQUET, *Cathédrale*, 8vo., Marseilles, 1857. The church of S. Victor is the most ancient in the city, its crypts and substructions are of the eleventh century, and many of the materials may have belonged to the temple described by LUCAN. The upper part dates from 1200; the two battlemented

towers which give it the air of a castle 1350, by pope Urban V. It was one of the most celebrated Benedictine abbeys of Christendom, and possessed a host of other religious houses dependent upon it. The chapel of Notre Dame de la Garde, lately enlarged into a capacious Romanesque church, is situated within a small fort on the summit of the hill of the same name. The lofty tower exists of the destroyed (1793) church of the Accoulés; among the others are the church of the Chartreux, 1633, one of the best in the city; Notre dame du Mont Carmel, 1622; and S. Théodore of the same century; Trinity is the richest church, as S. Pierre is the latest. A synagogue was 1861 in course of erection.

Among the civil and public buildings are, the hôtel de ville, erroneously attributed to P. Puget, whose design was rejected, but he is said to have constructed the great staircase; the prefecture, a large edifice, building in 1864; the custom house, with its pile of warehouses, on the south side of the old port; the exchange, erected 1856-60 by P. Coste; the "Concours," is given in DALY, *Revue Générale*, 1842, iii, 122; and in *CIVIL ENGINEER*, etc., *Journal*, 1841, iv, 243: the hôtel Dieu, very large but not otherwise remarkable: the theatre of the école de médecine 1749 by C. M. de Lagardette among other works by him in the city: the museum occupying the church of the Bernardines, containing a few relics only of antiquity; with its picture gallery; and public library adjoining, containing upwards of 70,000 volumes: beyond it is the new observatory. The zoological gardens are well laid out, and contain the museum of natural history: an orangery 'near Marseille' is given in *BAUZEITUNG Journal*, 1844, pl. 590. Of the many theatres, one designed by C. N. Ledoux, is given in his *L'Architecture*, etc., fol., Paris, 1789-1846, ii, pl. 71-7. There are important railway stations.

No. 189 Map published by the Society for the Diffusion of Useful Knowledge. *BUILDER Journal*, 1856, xiv, 689; xx, 811. BODIN, *Marseille Régénérée*, 4to., Mar., 1856. GROSSON, *Recueil des Antiquités*, 4to., Mar., 1773. POWNALL, *Notices*, 4to., London, 1788, p. 56. DUPLESSIS, *Voyage à Marseille*.

CAP COURONNE is the name of a calcareous stone much used in the locality. 14. 28. 50.

MARSHALL (EDWARD). His petition for confirmation in the place granted by the late king Charles I. "of master mason in the office of works, having constantly endeavoured to promote His Majesty's interest in the late Common Councils," is noted in *CALENDAR OF STATE PAPERS, Domestic Series*, 1660-1, 8vo., London, 1860, p. 13: the grant of the office of master mason of all works in the Tower and the king's other residences, with a fee of 12d. per day, is noted p. 74. He died 10 December 1675, aged 77 years, and was buried near the chancel in the old church of S. Dunstan's in the west, Fleet Street, London, leaving a son JOSHUA, master mason to Charles II, who was probably the Joshua Marshall, master of the masons' company in 1677, and who executed 1674 the stone pedestal to the statue of king Charles I at Charing Cross, usually considered (and so stated in WALPOLE) to be the work of Gibbons; *ART Journal*, fol., London, 1870, i, 102. He died 16 April, 1678, aged 49 years, and was buried near his father. The epitaphs are given in DENHAM, *S. Dunstan's*, fol., Lond., 1829, p. 27. Some of the tombs executed by the Marshalls are named in WALPOLE, *Anecdotes*, 8vo., London, 1862, p. 389, 536.

MARTELLI (GIUSEPPE) of Perugia, modernised 1838 the spedale di Sta. Lucia; and also 1835 the hôtel d'Italie; both at Florence. FANTOZZI, *Guida*, 8vo., Florence, 1842, p. 444, 551.

MARTELLI (TOMMASO), living in 1600 at Bologna, was one of the judges to whom the designs for the church of S. Salvatore were referred. He designed the palazzo di Barbiano for cardinal Guastavillani; the church of S. Giorgio for the Servites, rebuilt 1779 almost entirely after the earthquake; and the brick paneled campanile of the certosa. 94. 105.

MARTI (PADRE FRAI GASPARE DE SANT), born 1574 at Lucena, became 1 June 1596 carmelita calzado at Valencia,

where he designed the *portada* of the church of his monastery, constructed the lower half of its campanile, and lengthened the church by the addition of the presbiterio and trasagrario; he made the plans for the flesh market, the fish market, and other public works; was consulted 1631 with A. Ortiz and P. Albiniano de Rajas on the proposed markets at Zaragoza; and 1638 was engaged to examine the works in progress to the church at Chelva under J. H. Larrenaga. He died 8 April 1644 at Valencia. 66.

MARTIN (ABBÉ DE SAINT), see PRIMATICCIO (F.)

MARTIN (FRANCISCO), apparently a lay brother of the Premonstratensians, began 1590 the monastery of his order, about a mile from Ciudad-Rodrigo, and the church, which did not receive its dome till the time of J. de Sagarvinaga, who erroneously has the credit of Martin's work. 66.

MARTIN (GAUTIER), mason, master of the works at the city of Ghent, made 1416 a wooden model 3 ft. long of the gate of S. Pry in duplicate, the sheriffs keeping one copy and himself the other, which gate after his death was completed by Claise van Dalle; FONS-MÉLICOQ, *Les Artistes du Nord*, 8vo., Béthune, 1848, pp. 130, 150.

MARTIN (GUILLAUME), built 1152 the church of S. André-le-bas at Vienne, in France; CHORIER, *Antiq. de Vienne*, 8vo., Lyon, 1659, p. 74-5, and DALY, *Revue Générale*, 1840, i, 139.

MARTIN DE OLIVA (DIEGO), see OLIVA (D. M. DE).

MARTIN RODRIGUEZ (MANUEL), see RODRIGUEZ (M. M.)

MARTINELLI (ANTON) erected 1727 the Invaliden-haus or hospital, 2220 ft. in circuit, with its four large courts, at Pesth. 26.

MARTINELLI (DOMINIK), was born 1650 at Innsbruck. He had a large practice at Vienna, including the designing of the Liechtensteinische Majorat-haus in the Vordern Schenkentrasse; but the Liechtensteinische Sommer Palast, with its garden in the Rossau, was built about 1698 from Martinelli's design by A. Kristian. The *schloss* of prince Kaunitz at Austerlitz begun by Martinelli was not finished till 1750 by W. Petrucci. He superintended a number of bridges and fortifications, as that of Fosdinovo in Modena 1700, besides palaces in Germany and elsewhere; and died 1718 at Lucca or at Vienna. The *Memorie della vita di D. M. sacerdote Lucchese e insigne architetto*, 8vo., Lucca, 1772, has not been seen. For his supposed connection with the church of S. Carlo Borromeo at Vienna, see MARTINOLLI (P.) 3. 5. 26. 30. 68. 112.

MARTINETTI (GIOVANNI BATTISTA), of Bologna, designed in that city 1794 the palazzo Cappelletti now Naldi; 1806 laid out the public gardens; and superintended the erection 1814 of the teatro Contavalli from the designs of G. Nadi. 105.

MARTINEZ (. . .) of Messina, designed 1776 the façade of the church of the Annunciation at Turin: and is buried in its subterranean cappella della Madonna della Grazie; STEFANI, *Torino*, 12mo., Turin, 1852, p. 80.

MARTINEZ (ALFONSO), maestro mayor of the former moresque cathedral at Seville at least 1386-90 was more probably the designer of the existing edifice ordered 1401 to be a church "tal y tan buena que no haya otra su igual", than P. Garcia, who is not mentioned before 1421. 66.

MARTINEZ (FRAY PEDRO) born 1675 and christened (9 May) Juan, at Quintanilla de la Mata near Burgos, became 8 December 1698 a Benedictine monk and was immediately employed by his order as maestro of the works for the northern portion of his house and 1705 the *retablos* in its church of S. Pedro at Cardena, its priorial house at S. Martin del Rio, its priorial mills at Rezmondo; for the completion 1719 of the church of S. Pedro begun 1545 by J. de Badajos; the mills near Mansilla de las Mulas; the front of the *vicaria* of the nunnery of S. Pelayo at Oviedo; perhaps the *retablo* of the iglesia de la Vega in that city; and the staircase on arches and columns in S. Benito el Real at Valladolid. The propriety, simplicity, and elegance of his works were so much above the taste of that

time, as to excuse any confusion between a chapel to the titular saint for the monks of S. Domingo at Silos, and their church designed 1755 by V. Rodriguez. As diocesan-architect for Burgos, with 600 ducats annual salary, he designed the bronze screens and pulpits in the cathedral, the sacristy with its presses, and a chapel in its cloister; completed the collegiate church at Piñaranda de Duero; and erected the third cloister with the front of the *porteria* of the monastery of N. S. del Prado near Valladolid; besides works at the churches of Haro, Gunuel del Mercado, Sorillo, etc. He was buried 4 February 1733 in the monastery at Oña in the Asturias, leaving in its library his books, drawings, and about a dozen manuscripts in which he treated of applied geometry, mechanics and hydraulics, arches and vaults, the transept and his screens at Burgos, his invention of an 'archimetro' which he seems to have improved into a 'pantometra, o compas de proporcion,' and the faults in *el curioso arquitecto*. 66.

MARTINEZ (FRANCESCO). His name appears in the list of artists employed on the cathedral at Milan under the date 1765: FRANCHETTI, *Storia*, 4to., Milan, 1821, p. 146.

MARTINEZ DE ARANDA (GINÉS), maestro mayor about 1575 of the cathedral of Santiago in Galicia, was uncle and master of J. de Aranda Salazar, and wrote a treatise on architecture which, although known to have been dedicated to the archbishop Maximilian of Austria, does not seem to occur in print. 66.

MARTINEZ DE ARCE (JUAN), continued 1652-6 the church at Chelva in the province of Valencia, begun 1634 by J. H. Larrenaga; and was succeeded by J. Artigues. 66.

MARTINEZ DE LA VEGA (TORIBIO), maestro mayor to the city of Murcia, constructed the bridge over the Segura; and died 5 April 1733, leaving the execution of the aqueduct bridge for the supply of water, revived 1736, from La Fuente del Rey near Churriana into Malaga, to his sons Antonio and Andrés, who raised twelve piers and four out of twenty-two arches, when the work appears to have stopped, after an expense of 15,000,000 reals: it was completed 1794. MALAGA. 66.

MARTINEZ PONCE DE URRANA, (DIEGO). See URRANA (D. M. P. DE).

MARTINI (FRANCESCO), of Bologna, built 1641 the church of S. Joachimo, or S. Gioacchino, or della Natività dei Capuccini, now the parish church of SS. Filippo e Giacomo; 1636, the church of SS. Giuseppe ed Ignazio, conservatorio delle putte di S. Giuseppe; 1662 was placed the first stone of the church of SS. Trinita, completed 1720 by G. A. Torri; he designed the lazaretto at Bologna, as shown by a print with his name, and dated 1631, in the British Museum; assisted and directed the enlargement of the works of S. Petronio 1676; and was architect del Pubblico. 94. 105.

MARTINI (LUCIANUS) of Laurana, appears as a complete mediæval Latin name in GAYE, *Carteggio*, 8vo., Florence, 1839, i, 216-7, noticing that Laurana or Lovrana, is a small town in Illyria: evidently the proper Italian form would be MARTINO (LUCIANO DI).

MARTINI (FRANCESCO DI GIORGIO), of Siena; born about 1423 (not 1439); he studied at Rome, Gubbio, Ferrento, probably visited Lombardy, returned to Siena, and married in 1467. He is the subject of a romance in VASARI, who ascribes to him the palace at Urbino, designed by L. (Benvenuto) di Laurana, and finished by B. Pintelli or Pontelli; a frieze of seventy-two paintings of instruments used in war (which are really in basso rilievo, and were removed 1756 to the upper corridors of that palace); the palace and episcopal church at Pienza, formerly Corsignano, for Pius II. (1458-64) who in his *Commentaries* ascribes them to B. Gamberelli called il Rosellino; and the palazzo Piccolomini and its loggia 1460 for the same pontiff at Siena, with the fortifications of that city; VASARI also gives incorrectly the year of the death of this artist as 1486, instead of about 1506, as by PROMIS, which would make him then about 83 years of age: and allows the fonte di Ful-

lonica 1489 at Siena to be attributed to him; as also the cloisters of S. Francesco. His name occurs under the date of 27 June 1490 in the list of persons consulted at Milan cathedral, in FRANCHETTI, *Storia*, fol., Milan, 1821, p. 143; and he was also consulted on the works at Pavia cathedral. He may have been engaged at the monastery of L'Osservanza near Siena, but not so early as 1423, as stated by MILIZIA, who puts his death in 1470, and follows the mistakes made by VASARI as to the works at Pienza, and the palace at Urbino, but remarks that BIANCHINI, *Spiegazione del palazzo d'Urbino*, insists that the principal architect of the latter edifice was Luciano da Lauriano: the HANDBOOK ascribes the merit of the decoration of its doors, windows, cornices, pilasters, and fire-places to Martini, assisted by Ambrogio Barocci. To this Luciano (Benvenuto) da Laurana, and to Pontelli (but by no means to L. B. Alberti), the palazzo ducale, or della corte, built for duke Guidobaldo I. of Urbino (1482-1508) at Gubbio, and now partly destroyed, has been attributed by some authors; while others give credit entirely to Francesco for this building; which exhibits amongst its decorations the order of the garter given by Henry VII. to that duke. The church of the Madonna del Calcinajo at Cortona is given to him, and not to (A. Giamberti) da San Gallo in note 4 on p. 506 of the second volume of the English translation of VASARI, who in the introduction to his second part is made to speak of "the vast and commodious edifice erected by F. di Giorgio, in the church and palace of the duomo at Urbino." This valuable remark, if true, explains the confusion between the palace built by Luciano and continued by Pontelli, who was residing there in 1481, and the palace built by Francesco, who during his residence there wrote a *Trattato d'Architettura civile e militare*, cited by VIOLETT-LE-DUC, *Dict.* vii, 255; viii, 417. A copy of this work existed in the libreria Magliabecchiana, another in the public library at Siena, and a third, formerly in the possession of Scamozzi, is in the library of S. Mark at Venice; RUMOHRE, *Italien-Forsch.*, 8vo., Berlin, 1827-31, ii, 1851: it was published in two volumes with an atlas, 4to., Turin, 1841, by C. Saluzzo, preceded by a memoir by C. Promis which gives minute details respecting the life of this artist. A notice, of the military portion of the *Trattato*, by captain Tylden occurs in the CORPS OF ROYAL ENGINEERS, *Papers*, 4to, London, 1849-50, pp. 170-186. 28.

MARTINO (LUCIANO DI) is one form of the name of that L. Laurana, L. da Laurana, L. Laurana, L. Laurano, and maestro Lutiano, who should properly be described as Luciano di Martino Benvenuto da Laurana. He was the designer about 1467 of the ducal palace (now the government house) at Urbino which was completed by B. Pontelli; and of the fort of Sasso Corbaro, for the count (1444), afterwards (1474-82) duke Federigo I.

MARTINO (PIETRO DI), of Milan, designed 1443 the triumphal arch of Alfonso I in Castel Nuovo at Naples; it was made for the piazza del duomo, but was squeezed in between two Angevine towers, as the proposed site would have involved pulling down the tower of Niccolò Bozzuto, a veteran officer of the king; this arch is erroneously attributed to G. da Majano. 73.

MARTINOLLI (PHILIPP), built from the design of J. B. Fischers von Erlach, the church of S. Carlo Borromeo, commenced 1736 at Vienna. Overlooking this date, FREDDY, *Descr.* 8vo., Vienna, 1800, ii, 28-33, insists that this name means Domenico Martinelli of Lucca (and not of Innsbruck as TSCHISCHKA records) to whom he also attributes the design: FISCHERS (J. B.); MARTINELLI (D). 26.

MARTIN'S CEMENT. A patent fireproof and ornamental cement made at Derby about 1835, by Richard Martin, from gypsum or limestone. In a communication to the Institute of British Architects, 18 Feb. 1839, he states that the composition consisted of a solution of pearlsh and sulphuric acid mixed to the exact point of neutralization with powder of gypsum, and

the whole calcined together; but it is now said to be plaster which after having been burnt is soaked in a saturated solution of alum and reburnt.

The great superiority of this cement arises principally from its chemical composition being perfectly neutral and not having any free acid in it which will affect paint or otherwise interfere with decorations put upon it. It can be finished either (with sand) to a rough ashlar stucco face; made perfectly smooth from the trowel; or polished if required. There are not any deliquescent substances mixed with it in the manufacture, and great care is taken to keep it as uniform as possible. It has been used in many of our largest public buildings, in many churches, convents, and hospitals, and large private works for the undermentioned purposes: *i.e.* for angles, being harder and cheaper than wood, skirtings, ceilings, architraves, walls of drawing-rooms, bath-rooms, hospital wards, and staircases, for window linings, and in fact for all purposes where durability, hardness, reverberation of sound, and especially high finish are required. The interior of S. James's music-hall, Piccadilly, 1858, was plastered with this material; the elaborate ceiling was completed in less than a month.

Three qualities of the cement are now made: coarse, fine, and superfine; also some tinted in colours; by J. C. Part of Derby and London. For *walls*, the coarse cement should be used for the undercoat of half an inch thick, in the proportion of one measure of cement to one and a half of clean dry sharp-sand; to be finished with pure cement one-eighth of an inch in thickness. For *floorings*, an equal proportion of sand and cement, mixed stiff and *well beaten down* with a shovel to a thickness of three-fourths of an inch, on a solid foundation. It is to remain for ten or twelve hours, and then to be floated with pure cement half an inch thick. Plaster of Paris must not be used or mixed with this cement; and neither Roman nor Portland cements be used as an undercoat.

In 1860 it was advertised as being 35 per cent. cheaper than any other cement in use: and that it would cover 20 per cent. more surface at a less cost than an equal quantity of any other internal cement: it is sold by weight. The intense cohesion, solidity, and hardness it acquires, were proved in the experiments, detailed in the *Report* of a committee to the Royal Institute of British Architects; *Sessional Papers*, 1863-64, Table F. It requires only from about one to two hours to set; and may be painted on within twenty-four hours when put on lathwork. To prevent stains in the work, wood or zinc trowels are recommended; but if iron tools are used, they should be constantly cleaned with strong lime water. *BUILDER Journal*, 1860, xviii, 261. DONALDSON, *s. v.* Stucco, p. 175, in *ENCYCLOPEDIA METROPOLITANA*, 1840, gives the detail of its then manufacture. *CIVIL ENGINEER Journal*, 1839, ii, 100.

MARTUND. The name of one of those sites in Cashmeer, which exhibit remains of a style of architecture that, from known data and from the unequivocal mixture of an Armenian-Persian-Byzantine style with remnants of classic detail, do more than any tradition to justify the belief, that such men as METRONORUS ever existed. "The wood-cut will explain most of the peculiarities of the style; it represents a small model of a Cashmeer temple placed on a pillar." FERGUSON.

In this particular instance a temple, consisting of the Indian *vimana*, *antavala* and *mantapa*, all now roofless, has the peculiarity of wings to form a propylon; this portion is attributed to king Ranaditya, of one dynasty, about 600 A.D.: the enclosure, 220 ft. long by 143 ft. wide inside, was undoubtedly added by king Lalitaditya, of another dynasty, about 750 A.D. Illustration.



tions from the paper by CUNNINGHAM, *On the Arian Order of Architecture*, in the ASIATIC SOCIETY OF BENGAL *Journal*, 8vo., Calcutta, xvii, pt. 2, 1848, p. 241-327, are given in FERGUSSON, *Illustrated Handbook*, 8vo., London, 1855, ii, 125; and *History*, 1867, ii, 707, who notices others in the same *Journal* by ABBOT, as indicating the existence of a similar style in the Punjab; and also mentions that Ranaditaya married a daughter of the king of the Chola country near Madras, besides assisting in forming an aqueduct from the Cauvery. VIGNE, *Travels in Kashmir*, 8vo., London, 1842; 1843; 1848. HÜGEL, *Travels in Kashmir and the Panjab*, 8vo., London, 1845.

MARTYN (JOHN), prior of S. Augustine's, now the cathedral, at Bristol, was master of the new works in hand there about 1491-8; BRITTON, *History*, 4to., Lond., 1830, p. 50-1.

MARTYNE (MOIGNE), a French master mason employed 1536 in Scotland; MYLNE, in *Sessional Papers* of the Royal Institute of British Architects, 1861-62, p. 57.

MARTYR (THOMAS), was a pupil of S. P. Cockerell, architect to the East India Company; he subsequently continued his professional studies on the continent accompanied by his fellow pupil J. Kay, and on his return to England commenced practice; but on his marriage he entered into partnership with his father, then established with a good government connection as a builder at Greenwich. He died 2 January 1852 aged about 75 years. His eldest son, RICHARD SMIRKE MARTYR, became a pupil of his godfather Sir R. Smirke, R.A.; and after a short continental tour established himself in practice in Greenwich, and was much engaged in surveys and valuations of property for parochial and railway purposes, many railways being then projected and some in progress of formation in the western division of the county of Kent. He was the first surveyor chosen by the magistrates of the county to discharge the duties of the then newly created district of Deptford; he was also surveyor to the Burney estate, and to several local charities and trusts. His endeavour from motives of economy to carry into execution under contract with Messrs. Grissell and Peto, his design for the pier at Greenwich—a structure of iron piling and plating to be backed by hydraulic concrete, supporting brickwork—without the ordinary use of a coffer-dam, failed in consequence of the difficulties encountered in working in deep and rapid tidal water, and from the flow of the landsprings rising up through the foreshore of the river. Its construction is shown in CIVIL ENGINEER, etc., *Journal*, 1843, vi, 253; *Builder Journal*, i, 189. He was a member of the Architectural Society, and became 1842 a fellow of the Royal Institute of British Architects. He died at Greenwich 10 October, 1854, aged 43 years; and was succeeded as district surveyor by J. Whichecord.

MARTYRIUM (Gr. *μαρτυριον*). An evidence or a testimonial. In ecclesiastical buildings it is a place where relics of martyrs are deposited; and it is frequently applied by ecclesiastical writers to a portion of a church; APOSTOLEUM; BASILICA. BINGHAM, *Origines*, 8vo., London, 1840, ii, 347, 349, 355, 373.

MARUCELLI (PAOLO), added the sacristy to the chiesa di Sta. Maria, e.s. Gregorio in Vallicella, commonly called la chiesa Nuova, at Rome; and the fine fabrica della Porteria of the new convent of S. Andrea della Valle; both before 1686. See MAROSCELLI (P.) 12. 111.

MARVUGLIA (. . .) was elected 1805 corresponding member of the Institut des Beaux Arts at Paris, and died 1820.

MARVUGLIA (GIUSEPPE VENANZIO), born 1729 at Sta. Maria Nuova at Sciacca, studied at Rome and introduced a purer style of art into Sicily at the close of the eighteenth century; he designed 1769, at Palermo, the Oratorio di Olivella attached to the church of the padri Filippini; and also the palazzo Belmonte in the Cassaro; GALLY KNIGHT, *Normans in Sicily*, 8vo., London, 1838, p. 232. He died 1814. His son ALESSANDRO EMANUELE, was born 1773, and died

1845. Their monuments are in the church of S. Domenico at Palermo. 28.

MARZOCCO, sometimes incorrectly written *mazoccho* and *mazzoccho*. The painted or sculptured figure of a lion, emblematical of the republic of Florence, which decorates the gates and other parts of the city, and was put by the republic in places subject to its dominion, as at Leghorn, in the same manner as the lion of S. Marco was used by the Venetians in their dependencies. The original *mazoccho* stood upon the *ringhiera* or tribune whence the popular assemblies were addressed at Florence, where the fountain of Neptune now stands; and a pair of such lions are posted at the gates of the *bargello* or palazzo del podestà. This is the origin of the use of the lion shown in the *Illustrations*, s. v. Pedestal, ii, pt. ii, pl. 48.

MASABEL (BLAS DE), see MAZABAL (B. DE).

MASCALL, or MARSHALL (EUSTACE), is stated to have been clerk of the works to cardinal Wolsey at the building of S. Frideswide (Christ Church College) at Oxford, and for seventeen years chief clerk of accounts for all the buildings of king Henry VIII within twenty miles of London. He died in 1567, being then epistle reader in Windsor castle chapel. LYSON, *Magna Britt.* (Bucks), fol., London, 1813, i, 561; WALPOLE, *Anecdotes*, 8vo., London, 1862, i, 126. In Farnham church, near Slough, Bucks, is a brass plate with the inscription, "Eustas Malcolme gent clk of the works of Friswide in Oxford for Woolsey and clk of accomps for 17 yr to Hen. VIII. d. 1568"; BRITISH MUSEUM, Add. MS. 7100, slip 91.

MASCHERINO or MASCARINI (OTTAVIO or OTTAVIANO), born about 1524 at Bologna, was also a painter, having worked upon the decorations of the gallery and loggia of the Vatican at Rome (under pope Gregory XIII (1572-85), for whom he laid out the pontifical gardens of the Quirinal; FALDA, *Giardini*, fol., Rome, 1670; a cortile by him and F. Ponzio in the palace is given in ROSSINI, *Monumenti*, fol., Rome, 1818, pl. 32. The loggia at the head of the cortile and the small façade with double pilasters, and the winding elliptical staircase, of the pontifical palace on Monte Cavallo, is given in FERRERIO, *Palazzi*, fol., Rome (1655), pl. 49-50; who also shows pl. 99-101 the palazzo of the commendatore di Sto. Spirito in Sassianone di Borgo; with the façade of the adjoining church (built by B. Pintelli, and modified by A. da San Gallo) for pope Sixtus V, and the hospital for the infirm and foundlings, Rossi, *Nuovo Splendore*, fol., Rome, 1686, ii, pl. 25; but LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 543-5, pl. 256, states only the palazzo, with an arcade since destroyed, but shewn in a woodcut. He almost entirely rebuilt the church of S. Salvatore in Lauro after the fire, plan given in LETAROUILLY, p. 231, pl. 91: and completed the church of Sta. Maria transpontina S. Angelo, for the Carmelites, begun by G. S. Peruzzi, given in RUBEIS, *Insignium Romæ Templorum*, fol., Rome, 1681, pl. 65; and FALDA, iii, pl. 31: RUBEIS, pl. 69, gives the façade of the church of S. Maria della Scala, in Trastevere, then the monastery of the padre Carmelitani Scalzi, begun by F. de Volterra, but designed 1592 by M. da Castello. The palazzo for the prince de Sta. Croce, now the monte della Pietà; and many other buildings are assigned to Mascherino, who died at Rome aged 80 years, BOLOGNINI, 1841, i, 200, says 82 years, others circa 1605; being without a family, he left his drawings and his property to the academy of S. Luke in that city. 3. 5. 30. 33. 111.

MASCLE. A term used in Heraldry for the separate lozenge or mesh of a diapered surface: it is drawn with right angles, while the lozenge has acute vertical angles. 16.

MASEGNE, DELLE. Antonio CELEGA had two sons, Jacomello and Pietro Paolo, who were all thus designated: ORETTI and others read the sons' names on a relief in the church of S. Francesco at Bologna 1338; but they worked at Venice 1394-5. SELVATICO, *Venezia*, 8vo., Venice, 1847, p. 121, attributes several works to them, including the porte di

S. Stefano, of which he gives an illustration. Jacobello had a son Paolo who 1394 executed the tomb of Jacopo Cavallo in the church of SS. Giovanni e Paolo at Venice (p. 122); this may be the Jacopo Celega who began 1361 the campanile dei Frari in that city, completed 1396 by his son Pietro Paolo (p. 123), who appears to have been employed 1366 to construct the cathedral at Udine.

MASERAS (JUAN DE) of Valladolid, designed 1624 the *retablos* for the high altar and the smaller altars in the church of the Franciscan nunnery at Eybar in Guipuzcoa. 66.

MASHARABEYEH or MESHREBEYEH. The Turkish name for an enclosure on an upper floor projecting beyond the front of the building, in which persons sit to enjoy the fresh air.

MASK. (It. *mascherone*; Fr. *mascacon*; Ger. *fratzkopf*; *fratzen-gesicht*). A grotesque head placed upon the *keystone* of an arch; and it is often used on the orifice for the flow of water in a fountain. HEAD. MASQUE. 6.

The term is also given to a work placed in front of another, in order to conceal it; as noticed at CREMONA, thereby being to a certain extent a sham.

MASO (SIMONE, an error for POLLAJUOLO (SIMONE).

MASON or STONEMASON (Late Lat. *lapicida* and *latomus*; It. *muratore*; Span. *albanil*; Fr. *maçon*, *limousin*, *poseur*, *ravaleur*; Ger. *steinmetz*, *maurer*, *steinhauer*). A skilled workman in stone; one who understands the art of arranging stones with order and security; the working of mouldings; and who undertakes the construction of a building in rough or in worked stone. In Paris, the builder and the architect have to insure the stability of the houses for ten years, and are held accountable during that period for the expense of any repairs arising from imperfect workmanship or from defective materials. "Cementar" is the term used 1349, in the Statute of Labourers; but in that of the 25th Edward III, c. 2, s. 2, 1350-1, occurs "Mester mason de franchise peer 4d. et autre mason 3d." but these wages were doubled at Rochester Castle 1368, as stated s.v. *HOOK*. A "mason made a molde thereto" occurs in PIERS PLOUGHMAN'S *Vision*, 7274 (edit. by WRIGHT, 8vo, 1856), written in the reign of the same king. The term FREEMASON occurs soon afterwards. PAFWORTH, *Historical Account of Masons*, read at Royal Institute of British Architects, *Sessional Papers*, 1861-2, pp. 37-56; and DALLAWAY, *Discourses*, 8vo, London, 1833.

The "white mason", or hewer of stone, and the "red mason", or hewer of brick, are noticed in MOXON, *Mechanic Exercises* (Bricklayer), 4to, London, 1700, p. 1. A "Maçon de briques" is recorded 1412 as among those who worked on the fortifications at Béthune, by FONS-MELICOCO, *Les Artistes du Nord de la France*, 8vo., Béthune, 1848, p. 203.

In the west of England, the mason that sets the stone is called a "rough mason"; the man that works the freestone is called a "freemason"; a mason's labourer has always greater wages than a common labourer, as it requires skill and practice to attend masons; Wood, *Labourers' Cottages*, 4to, Bath, 1788, p. 9. The "bricklayer and rough mason" is referred to 1780 in MULVANY, *Life of Gandon*, 8vo., Dublin, 1846, p. 55. In Ireland, the *mason* and the *stonecutter* are two different persons.

The average quantity of ashlar wrought by one mason in one day was 55 cubic feet; they measured generally more than 30 cubic feet each; were properly dressed throughout, on the beds and joints, but were left rough on the face; as at the bridge over the river Tweed. *Proceedings of Institution of Civil Engineers*, 1850-51, x, 226. CEMENTARIUS; LATOMUS; LAPICIDA; STONECUTTER; MASTER MASON.

An image of S. Seraphinus, the patron of masons, with hammer and trowel, is noticed as existing in the north transept of the collegiate church of S. Stephen at Mainz, by WEBB, *Ecclesiology*, 8vo., London, 1848, p. 89. The underground chapel, called crypte de S. Basile, or chapelle des maçons, ARCH. PUB. SOC.

dating from the year 845, is beneath the chapelle du S. Sang at Bruges. A "mason in chief" is recorded 1680, s.v. *KNIGHT*. A *steinmetz*, afterwards a *meister*, occurs 1280, s.v. KOLDENBACH; the gradation of ranks may be gathered from C. FINK, s.v. A mason, the master carpenter, who erected a house 1611 at Nantwich, in Cheshire, is recorded in an inscription given in *Builder Journal*, 1859, xvii, 549.

The article BONNUEILL records the fact that ten masons and others travelled from Paris to Sweden to build the cathedral at Upsala: and under the MASTER OF THE WORKS, that he himself and three workmen proceeded to Jerusalem.

A representation of a mason at work, from painted glass of the 13th century, in Bourges Cathedral, is given in TURNER and PARKER, *Dom. Arch.*, 8vo., Oxford, 1851, i, 116. A figure of a mason or architect, with roll and compasses, occurs in the Spitalkirche at Stuttgart as a corbel; MUELLER and HEIDELOFF, *Kunste in Schwaben*, 4to, Stuttgart, 1855, p. 29. Two figures in wood, cir. sixteenth century, supposed to represent itinerant masons, fixed against a public house opposite Wooburn Church, Bedfordshire, are given by SOCIETY OF ANTIQUARIES, *Archæologia*, 1817, xviii, 421; they have the compass, rule, quadrant, and staff. The MS. of the 15th century, *Harl. 2278*, fol. 28b, represents a building scene; and WRIGHT, *Medieval Arch. from Illuminated MSS.*, in BRITISH ARCH. ASSOC. *Journal*, 8vo., Lond., 1845, i, 20, also shows masons at work. The tomb of a Roman mason, found at Mayence, is given, in C. R. SMITH, *Treves*, etc., 8vo., London, 1851, p. 63; another in ARINGHI, *Roma Subter.*, fol., Rome, 1650, p. 119. One of the twelfth century, in FREEMASON'S MAGAZINE, 1862, p. 103-4; 225.

MASON (HENRY), was paid, 28th September, 1614, "£146 11s. 7d. in full satisfaction of the charges of the building of a new tolbooth, of stone, containing a court-house, prison, and other necessary rooms, concerning the lordship of Barnard Castle, in the county of Durham, and for enlarging the market place there, according to a survey thereof taken by Sir James Fullerton, knight, surveyor of those lands", besides £48 10s. already paid; DEVON, *Issues*, 4to., London, 1836, p. 318.

MASON, TOOLS OF A. In facing a stone, the mason uses the *point* (called a *punch* in Scotland), the *inch tool*, the *boaster*, and the *broad tool*. Where the stone saved by the operation of sawing is not enough to compensate for the labour, the *mallet* and *chisel* are used for working it; when it is very unshapely, a *stone axe*, *jedding axe*, *scabbling hammer*, or *cacil*, is used to bring the stone nearly to shape. A *drag* is a plate of iron used to finish the surface of a soft stone by scraping it. Granite is brought to a face by the *DIAMOND HAMMER* or *patent axe*. The *lewis* is used for raising stones of large size. The *square*, *compasses*, *rule*, *level*, and *plumb-bob*, are also used by the mason. BROAD AXE; CHISEL.

The Inventory of things at Holy Island Priory 1367, enumerates 5 hatchets for cutting stones, secures pro lapides scindendis; 2 large hammers of iron (kevills); 2 hacks; 1 pulipike; 6 chisels; 2 trowels, etc. RAINE, *North Durham*, 1852, p. 86.

"In the 'loge' or mason's workshop belonging to York Cathedral in 1399, were 69 'staneaxis', 1 large kevell (a very large hammer), 96 iron chissielles, 24 mallietez bound with iron, 400 iron fourmers (small tools used in forming the surface of a lump of clay into a model to work from), 4 lead chargiours (dishes) for moulds, 2 tracing boards, 1 iron compas, 1 little hatchet, 1 handsagh, 1 chovel, 1 whelbarwe, 1 iron rake, 2 bokets with cords at the well for the same, 1 great kerr with 4 wheels for the stones, ... 2 kerrs with wheels for the carrying of stones without the loge, 4 iron weges, and 1 iron colrake. In the crypts were 6 stane-hammers, 6 troweles, 6 large setting chisiles, 1 ... bound with iron for making the mortar, 3 cretes bound with iron, with chains for winding stones; 1 measure for measuring plaster, 9 fattez for the water and plaster, 1 measure for measuring lime, 3 iron pykes, 10 beringbarwes, 2 whelbarwes, 1 large rota for winding stones and mortar with 4 large cabels, 160 flekes (hurdles for the

scaffold), 12 mets of sand: BROWNE, *York Cathedral*, 4to, London, 1838-47, p. 198.

In France, blocks of the grey chalk stones and oolites are worked with a *toothed axe* roughly into shape, and faced with it; they are then finished with a *plane* or rubbed with a sort of *grater*.

MASONED. A term used in heraldry when the field of the shield is covered with "the joints of stone work made by masons." 16.

MASONESQUI (.....) designed the theatre at Malaga. MASONRY (Late Lat. *Cementarium opus*; It. *fabrica*; Sp. *albanileria*; Fr. *maçonnerie*; Ger. *mauerwerk*). The art of forming constructions of stone upon a plan or system calculated to insure durability. The term 'masonry' was used in the reign of queen Elizabeth as the equivalent for "building": HARRISON, in HOLINSHED, fol., 1586, p. 195.

The modes of building walls in use among the ancients were the so-called Opus, RETICULATUM, INCERTUM, ISODOMUM, PSEUDISODOMUM, EMPLECTUM ROMANUM, and GRÆCUM. CYCLOPEAN MASONRY. POLYGONAL MASONRY.

The several sorts of masonry most in use for modern purposes may be classified under the following heads. RUBBLE WORK, consisting of random rubble set dry; random rubble set in mortar; random rubble set with quoins, joints, and architraves, and levelled in courses; coursed rubble set in mortar; sneaked rubble generally set in courses; rubble with ashlar binders; rubble in alternate courses with bricks or with tiles. *Flint rubble*, whole or cut; boulder or pebble rubble, whole or cut: the two last are generally used with brick, tile, or stone quoins and courses. *Slate rubble*, set in courses horizontal, or at an angle of 45 deg., or at any intermediate angle; examples may be found vertical. Herring-bone rubble. Intermediate between the rubble and regular coursed wallstone or ashlar, the stones may be set irregularly, labour being required to produce irregularity.

STONES SQUARED AND BEDDED. Coursed wall stone set dry. Coursed wall stone set in mortar. These may be rough-faced, pitch-faced, scabbled, punched, sketched, and boasted. There are other forms of finish for the face of coursed wall stones, and the beds and joints generally rise in finish to accord with the faces. Thus, rough-faced, or pitch-faced wall-stones have beds and joints: Rough picked, punched or sketched-off wall-stones have clean boasted beds and joints. Coursed wall stones vary in depth up to 9 ins.

BLOCK IN COURSE. This sort of masonry has all the varieties named for coursed wall stone, the difference consisting in the dimensions alone. It may commence from as little as 9 ins. in depth (or 6 to 12 ins.) and increasing until it verges into rough ashlar (being from 1 to 2 ft. in width, and 2 to 4 ft. in length); the dimensions in each case should be specified.

PARPOINTS may consist of wall-stone, block in course, or ashlar. Stones of this denomination are used in parapets or battlements. The faces may be rough or rubbed, or of any intermediate grade of workmanship.

ASHLAR, after coursed stonework, forms a main feature in masonry. The stones are always set in true courses, the depth being from 12 ins. to any available thickness (with an area on the bed of from 6 to 18 ft.; the bond may vary from 9 to 15 ins.). The beds and joints should always be chisel dressed; that is, drafted and boasted off. The varieties of finish for the face are very numerous; it may be rough-faced, frosted, sparrow-pecked, rock-faced, drafted and picked, or punched in a variety of ways, or diamonded, or reticulated, or rowed either horizontally, diagonally, or herring-bone. There are varieties of drafted and boasted work, random tooled, and stroke tooled; as also rubbed (or polished) faces. Ashlar may also have all the varieties of rustic work, from a plain groove or a chamfer, to the compound formed by a fillet and segment in addition.

The dimensions usually given to each stone ought to con-

sist of the depth about half the width, the length twice the width.

MASONRY CONSTRUCTION by R. Rawlinson, read at the Liverpool Architectural Society, 27 July, 1858 (*BUILDER Journal*, xvi, 102, 131), who gives *mazims* for masonry work. HASKOLL, *Clerk of Works, etc., Guide*, 12mo, London, 1849, p. 44. The working of a face in ASHLAR, is likewise explained s. v. Ashlar and Face-work; the same in GRANITE, is explained s. v. Granite, pp. 74 and 78; and for the operation in mediæval work, see DIAMOND HAMMER (Fr. *bretture*); also in GWILT, *Encyc.*, edit. 1867, § 1915a.

ASHLAR. BOND. FACE WORK OR PLAIN FACE. FLINT WORK. HAMMER-DRESSED WORK. HARMUS. MACERIA. RUBBLE WORK. RUSTIC WORK. SLATE WORK. STONE CUTTING or *coupe de pierre*. WALLING. 1.

Anglo Saxon Masonry, or mixed masonry in brick and stone, is treated by BLOXAM, in the *Archæological Journal*, 1845, i, 307-17; in *CIVIL ENGINEER*, etc., *Journal*, viii, 301; and in *Journal of Archæological Association*, i, 117. Useful observations on *Mediæval Masonry* will be found in the *ECCLÉSIOLOGIST Journal*, 1846, vi, pp. 42-5; copied in *CIVIL ENGINEER*, etc., *Journal*, ix, 312. *Art of building in stone* from A.D. 1000, by J. H. PARKER, in *BUILDER Journal*, 1860, xviii, 299, who places fine jointed masonry as first introduced into England about 1120; the chisel was not used (but see s. v. FACE WORK) at Canterbury 1100-20. A paper *On Masonry in the 12th and 13th centuries* (hatchet and axe) by the same author, in *Sessional Papers of the Royal Institute of British Architects*, 1866, p. 91. *Relative cost of Masonry* in freestone, gritstone, or sandstone, in *CIVIL ENGINEER*, etc., *Journal*, 1844, vii, 298. *On Building Works in Wales*, in NOBLE, *Professional Practice*, 8vo, London, 1836, p. 148. *Works at the Liverpool Docks' walls*, *BUILDER Journal*, 1859, xvii, 321. *On Greek Masonry*, by W. L. GRANVILLE, read at the Royal Institute of British Architects, 17 June, 1844, given with illustrations in *CIVIL ENGINEER*, etc., *Journal*, vii, 240. For *Herodian School of Masonry* at Jerusalem, see HEBREW ARCHITECTURE.

NICHOLSON, *Practical Masonry*, edited by Robson, 4to, London, 1854. ROBSON, *Masons, etc., Guide*, 4to, London, 1862. *On Masonry in Paris*, contributed to the "Records of Artizans" at the Paris Exhibition 1867, by Thomas CONNOLLY, also given in *BUILDING NEWS Journal*, 1868, xv, 42. LUCOTTE, *L'Art de la Maçonnerie*, in *Description des Arts et Metiers*, etc., fol., Paris, 1761-89. RONDELET, *L'Art de Bâtir*, with Supp., by BLOUET, 4to and fol., Paris, 1812, 1847-8.

MASON'S MARKS, see MARK.

MASOODAH. A wood of Travancore in the East Indies, of an ash colour, from 2 ft. to 8 ft. in circumference, is used for building. 71.

MASOON (MAGISTER SIMON LE), 1332, is the first recorded master mason at York Cathedral; SURTEES SOCIETY, *Fabric Rolls*, 8vo., Durham, 1859, p. 207.

MASQUE. Grotesque pieces of sculpture used to fill up vacant places, especially in grottoes. MASK. 4.

MASS, of a building, see EURHYTHMY and DECOR.

MASSACHUSETTS MARBLE. This material is obtained from Lee, in Berkshire county, United States of America. The extension of the capitol at Washington was erected of this stone. From experiments it was found that, after freezing and thawing, a scale 1,500,000th of an inch thick clears off from the surface; so that allowing fifty such exfoliations to take place every winter, it would require three thousand years to destroy the surface of a building to the depth of one inch by this cause: *BUILDER Journal*, Dec. 20, 1856, from the *Berkshire Eagle* paper.

MASSARI (FRANCESCO) built 1650 the church of S. Lorenzo al Borgo; and rebuilt 1659 the church of S. Lorenzo in Piscibus, at Rome, for the duke of Acqua-Sparta of the Cesi family, who gave it to the PP. de Scuolo Pie; its plan is

given in LETAROUILLY, *Rome*, 4to., Paris, 1840, p. 236, pl. 97 (these may be the same building); and the palazzo Cesi al Borgo Vecchio, according to GWILT, but LETAROUILLY, p. 136, says it was restored (and enlarged 1596) by M. Lunghi the elder. 12. 111.

MASSA DUCALE or DI CARRARA. A town in the state of Modena in Italy, situated near the river Frigido. The streets are spacious and well paved, with well-built houses, for which the CARRARA MARBLE is largely used. The cathedral, dedicated to SS. Peter and Paul and Francisco d'Assisi, and is a plain building of the 17th century, having a curious ancient doorway taken from the former cathedral, which was destroyed in a few weeks during the rule of Bonaparte's sister, Madame Baciocchi. Many tombs in it were executed by Goro di Gregorio, cir. 1323; *Nouv. Biog. Générale*, 8vo, Paris, 1857, by Didot. A large palace (perhaps the "palais Massa" given in LECLERE, *Recueil*, fol., Paris 1826, pl. 66, drawn by his pupil Chatenet); and an old castle, seated on a rocky ridge, comprise the other buildings of note. 28. 50. 96.

MASSA LUBRENZE or DI SORRENTO. A town situated on the gulf of Naples, in Italy. It is the see of a bishop. The cathedral dedicated to the Annunciation has a detached campanile; the church of S. Francisco is supposed to occupy the site of a temple of Juno. There are the remains of a Roman aqueduct, and other edifices, and an episcopal palace. 28. 50. 96.

MASSA MARBLE. This material is obtained near Torno and Tambura in Italy; see FIOR DI PERSICO.

MASSA MARITIMA or DI MAREMMA. A town near Siena in Tuscany, in Italy. It is the see of a bishop, the seat of several public offices, and has a cathedral dedicated to S. Cerbone, dating from 1225, with three tiers of arcades in its facade, and was restored 1483 and later; and a parish church. 28. 50. 96.

MASSARI (GIORGIO) practised at Venice, where he designed 1720-43 the church of Sta. Maria del Rosario, called I Gesuati, having one of the handsomest fronts in Venice; 1736 the church of SS. Ermagora e Fortunato, called Sta. Marcuola; that of La Pietà sulla riva degli Schiavoni; the palazzo Grassi on the canal grande; added the third order to the palazzo Rezzonico erected by B. Longhena; and designed the scuola della Carità executed by B. Maccarucci. SELVATICO, *Architettura in Venezia*, 8vo., Venice, 1847, pp. 463-5. 26.

It was probably this GIORGIO MASSARI who designed the facade of the church of S. Antonio, the altar-piece at that of the Madonna delle Grazie, and the small church of Santo Spirito, all at Udine. MANIAGO, *Guida*, 8vo., San Vito, 1839, pp. 40, 42, 58, 87.

MASSE (.....), a surgeon, designed 1753 the well constructed amphithéâtre de S. Côme at Bordeaux; it has been used since 1830 for the école secondaire de médecine.

MASSICOT, formerly MASTICOTE and masticcoat (Fr. *Masticot*). A pigment of a light yellow colour, being white lead calcined by moderate heat to that tint, lighter or darker as may be required; it is easy to grind, and of a good body; mixed with blue, it makes a good green. With orpiment, it was probably among the least durable of the ancient colours.

A current of heated air being passed over the surface of lead in a molten state, it speedily becomes covered with a yellow powder much resembling small scales called *massicot*; LITHARGE. It was also stated 1700-1809 to be made from flake white gently burnt until it turns yellowish.

MASSILIA. The ancient name of MARSEILLE in France. MASSIMBENI (ANDREA), worked with Orazio CALZOLARI, at Cremona. 57.

MAST, see FLAGSTAFF.

MASTER. The chief or head of a trade or business, as master builder (used in the translation of the ΑΠΟΚΡΥΦΑ, *Maccabees*, ii, 2, v. 29), master carpenter, etc.

MASTER ARCH OF A BRIDGE. The term given by old writers to the centre, or widest, arch of a bridge. 13.

MASTER OF THE CRAFT, or Architect, is noticed in HORMANUS, *Vulgaris*, 4to., London, 1519, fol. 12 and 245.

MASTER OF THE FABRIC. An inscription in the Campo Santo at Pisa contains the words "Operario Orlando Sardella; Joanne Magistro Edificante", the latter name being that of Giovanni da Pisa, the celebrated architect and sculptor. CICOGNARA, *Storia*, fol. Venice, 1813, p. 193. M. de ARRAS. The *Stranger's Guide through Lincoln Cathedral*, 8vo., Lincoln (1840), 20, states that "the Precentor, Chancellor, and Subdean, are under the patronage of the bishop—these three, with the dean, constitute the body of 'residentialaries', in whom the control of the church is placed—each one residing in turn three months. The arrangements as to residence are usually made in September, at which time two of the four are appointed 'Masters of the fabric' for the year." Gaufridus de Noiers, the supposed designer of S. Hugh's (1186-1201) portion of Lincoln Cathedral, is designated "nobilis fabricæ constructori", in ASSOCIATED SOCIETIES' *Reports and Papers*, 1858, pp. 17, 39.

MASTER OF THE WORK (Sp. *maestro mayor*, or chief director of the works). The first of the six greater officers in a monastery was the *magister operis*, who probably looked after the buildings, and kept them in good repair. BURTON, *Mon. Ebor.*, fol., Lond., 1758-9, p. 64. At Salisbury, in 1334, "although there was a regular master of the works, the chapter recurred to R. de FARLEIGH, 'builder', who was to be entrusted with the custody of the fabric, to order and do all necessary work in the same, to superintend, direct, and appoint useful and faithful masons and plasterers", etc.; this agreement is given in DODSWORTH, *Salisbury*, 4to., London, 1814, p. 151-2. GOUGH, *Croyland Abbey*, in BIB. TOPOG. BRITT., 4to., Lond., 1783, iii, App. pp. 51 and 73, gives a very curious monastic record relating to this officer. His title is noticed by LENOIR, *Arch. Monastique*, 4to., 1852-6, p. 39. Bernardus de Coimbra is mentioned before 1168 as "in opera ecclesiæ magister per decem annos." Later notices of masters of the works occur in BRITTON and BRAYLEY, *Palace of Westminster*, 8vo., London, 1836, pp. 61, 110, 198; and in BROWNE, *York Cathedral*, 4to., London, 1847, pp. 161, 166. Sir H. Nicolas, giving the *Priests' Chronicle* in his *Agincourt*, 1832, p. 200, states that at the siege of Harfleur, 1415, Master Giles, the king's chief engineer, caused a trench to be constructed by the lancemen and bowmen, having appointed "masters of the works", and assigned certain feet of ground to each lance and bow. ALDEHÜELA. DISSCHINGTON. FABER.

André, *magister operis* at the church of S. Genez in the diocese of Belley in France, about the middle of the eleventh century, with three workmen, went to Jerusalem; quoted from the record given in DALY, *Revue Générale*, 4to., Paris, 1840, i, 137.

John Ashfield, late master of the new works at Bristol Cathedral, had arrears of salary for nineteen years due to him in 1492. Prior John Martyn succeeded him in the office; BRITTON, *History*, etc., 4to., London, 1830, pp. 50-1. The words in the Will, 1403, of William of Wykeham, bishop of Winchester, appear to show that William Wynford, a master mason, was the master of the works, i.e., the designer: "Volo etiam et ordino quod dispositio et ordinatio hujusmodi novi operis fiant per magistrum Wilhelmum Wynford et alios sufficientes, discretos, et in arte illâ approbatos ab executoribus meis deputandos; ac quod Dominus Simon Membury sit supervisor et solutor dicti operis sit in futurum." PAPWORTH, *Superintendents*, etc., read at Royal Institute of British Architects, *Sessional papers*, 1859-60, pp. 44-5.

Maister of the Warkes, a deviser of building, architector et architectus; *Dictionary* of Sir Thomas Elyot, fol., London, 1538.

SAUVAL, *Histoire de la ville de Paris*, fol., Paris, 1724, ii, 23, states that the great staircase (*vis*) of the Louvre was erected in the reign of Charles V, "et conduite par Raimond du

Temple, maçon ordinaire du roi"; to which VIOLETT LE DUC, *Dict., s. v.*, Escalier, p. 300, adds, "R. du Temple était sergent d'armes et en même temps maître des œuvres du roi Charles V". DIDRON, *Annales Arch.*, 4to., Paris, 1848, viii, 149, states that at Strasburg, the *maître-d'œuvre*, magister operis seu fabricæ, originally signified the receiver (*receveur*) and not the architect, until the end of the 13th century, it being applied to the latter about the first half of the century following. The term (Ger. *werkmeister*) was specially applied to the military engineer; and at Strasburg was always applied to the master carpenters of the city.

MASTER OF THE KING'S WORKS. A term used both in England and Scotland; W. ADAM, 1751; J. ADAM; MYLNE.

MASTER AND SUPERVISOR OF THE WORKS are the denominations given to Richard BEAUCHAMP, 1474, by writ of king Edward IV.

"The king (James I) has appointed St. James's Palace for the residence of the prince; but there being neither barn nor stable there, warrants to the Exchequer and Master of the Works are required to have them built", July 12, 1604; RECORD COMMISSION, *Domestic Series*, 8vo., London, 1857, p. 132 and 135.

Masoun wrycht and maister of wark (craftsmen), occur in ACTS OF THE PARLIAMENTS OF SCOTLAND, fol., London, 1814, ii, 489-90.

MASTER PIECE (Fr. *chef-d'œuvre*; It. *capo maestro*; Span. *obra magistral*; Ger. *meister-stück*). MAGISTERIUM. A work, which a fellow of a craft aspiring to be a master, had, in former days, to make in the presence of the elders of the guild or city, to prove his capabilities and fitness for the position. VIRLOYS describes the examples set in each trade. 5.

MASTER RIB (Fr. *arc doubleau*). A band or wide rib carried from wall to wall in a vault, so as to strengthen the barrel; a term proposed for adoption in ECCLESIOLOGIST *Journal*, 8vo., London, 1846, v, 170; but the French term as above, is generally used by writers.

MASTER MASON (*magister cæmentariorum*). A term used early in the mediæval ages, which may be considered equivalent to that of a builder, designer, or architect. Bishop Gundulfus (*cir.* 1100) is recorded as "in opere cæmentario plurimum sciens et efficax", *ANGLIA SACRA*, i, 338. William of Sens, designated "a most skilful artificer", delivered the moulds for cutting the stones, 1175, at Canterbury Cathedral; he was called "the master", and was succeeded 1179 in that office by William the Englishman. Previously to the commencement of Westminster Abbey by Henry III in 1216 it is recorded "convocati sunt artifices Franci et Angli"; T. WALSINGHAM, in *Decem Scriptores, Chron. Gervasii*. A master mason designed the spire of Louth Church, 1501-6, see COLE and LAWRENCE in the erection of the church at Fotheringhay, Northamptonshire, by William Horwod, freemason, he undertook, 1435, to build it "by oversight of maisters of the same craft"; the 'setters' being chosen by the overseer of the work; if Horwod complained of them, "then by oversight of master masons of the countree they shall be demyd", etc. Cornelius Cure, "master mason of His Highnesses works" (James I), was paid £200 on account of a sum for framing, making, erecting, and finishing a tomb for queen Mary of Scotland, by writ 19 April, 1606; DEVON, *Issues*, 4to., London, 1837, p. 35, 50, 75, 100, 168. In 1620, a grant of the office of master mason and architect was made to Nicholas Stone of all the buildings and reparations at Windsor Castle; RYMER, *Fœdera*, fol., London, 1726, xviii, 675; and WALFOLLE, *Anecdotes*, 8vo., London, edit. 1862, iii, 494 at end.

DALLAWAY, *Discourses*, 8vo., London, 2nd edit. 1833, gives, p. 421, a list of master masons in England from the 12th to 16th century, as compiled by him; also PAPWORTH, *Historical Account of Masons, etc.*, in *Sessional Papers* of the Royal Inst. of Brit. Architects, 1861-62. FELIN. LOUDHAM.

For the title of master mason in Scotland, see W. ADAM,

1751; J. ADAM; and MYLNE. The first time the term is used at Aberdeen is in the year 1622: SPALDING CLUB, *Aberdeen Burgh Records*, 4to., Aberdeen, 1844-8, ii, 376; his duties at Aberdeen are detailed in i, 68.

DIDRON, *Annales Arch.*, 4to., Paris, 1848, viii, 149, states that the *maître-tailleur de pierre* (Ger. *steinmetz*) occupied a higher position than the master mason, being the designer, whereas the mason was only the builder. The inscription on the tomb of G. Le Telier, who died 1484, at Caudebec, states he was master mason of the church there for upwards of thirty years; DE CAUMONT, *Abécédair*, 8vo., Paris, 1850, 387. CARLIER, *Hist. du duché de Valois*, is stated to record the notice of an officer under the title of "Maitre des œuvres de maçonneries et voyer du duché de Valois." P. de l'ORME, *Architecture*, fol., Paris, 1567, notices that some self-styled architects were but mere master masons, whilst others were only geometicians, or men addicted to the literature, but neglected the practice, of their profession.

MASTIC. The produce of the *Pistacia Lentiscus*; see VARNISH.

MASTIC. An oleaginous cement, originally introduced into England under the name of HAMELIN'S CEMENT. CEMENT; FITZ LOWITZ; LIARDET; LORIOT; MALTHA. In France, the term is applied to a kind of cement used to fill up joints in outside stonework, and to join marble: in joinery, to a composition of wax, resin, and pounded brick, applied to fill up the knots and chinks in the wood: moulds for forming plaster ornaments were made of a similar composition: and a mixture of whitening and oil of a firm texture (called PUTTY in England) for fixing glass in sash frames. 5.

MASTICOTE, see MASSICOT.

MASUCCIO I, also a sculptor, was born at Naples 1228 (*Biog. Nap.*, vii), 1230 (MILIZIA), or 1270. He completed 1266 the *castel nuovo*; and the church of Sta. Maria della Nuova, begun by G. da Pisa; designed and erected the archiepiscopal palace in the Pointed style (also attributed to Maglione); and 1285-9 the church of S. Domenico Maggiore, since much altered; rebuilt the church of S. Giovanni Maggiore, rebuilt by C. Fansaga; restored the church of S. Aspremo, built by Formicola in the tenth century; and for Charles I and II, 1266-99, the cathedral dedicated to S. Gennaro, which is sometimes attributed to Nicolo da Pisa; the facade was by Bambocci. Among the number of palaces designed by him at Naples and Rome, is that which formerly belonged to the prince of Colombrano, and also the palazzo Sant' Angelo, restored 1466. He died 1305 (MILIZIA and *Biog. Nap.*), aged 77 years, or ceased to work 1306. CICOGNARA, *Storia*, fol., Venice, 1813, i, 467. BIOGRAFIA—DEL NAPOLI, 4to., Naples, 1820, vii. 2. 3. 36.

MASUCCIO (STEFANO, or Tommaso de' Stefani, also Pietro de' Stefani), called Masuccio II, born at Naples 1291, was a disciple of the above, and also a sculptor. While studying at Rome, he was invited to Naples by king Robert to erect the church of Santa Chiara; but not responding immediately, the edifice was commenced 1310 in the Pointed style by a foreign architect, who left his work so incomplete that it was almost rebuilt about eight years (1318-28) afterwards by Stefano, who died in 1387, aged 96 years. This church was renovated 1752-3, under the direction of an engineer, don Giov. del Gaizo. Stefano is said to have designed (1328) the lower part of the CAMPANILE (*Detached Essays*, s. v., p. 4, with woodcut) to this church, but it is the work of his pupil Giacomo de Sanctis. He built 1344 the church of S. Giovanni a Carbonari; and with ... Maglione, 1267-1324, the church of S. Lorenzo; these, however, with other works, belong to his pupil. CALDERARI, *Storia*, fol., Venice, 1813, i, 467. BIOGRAFIA—DEL NAPOLI, 4to., Naples, 1820, vii. 3. 25. 28.

MASUCCIO (PADRE NATALE) of Messina, a priest, celebrated, from his architectural skill, in the eighteenth century, having designed very many buildings and churches in Sicily,

especially the Jesuit College at Messina. This may be the università built after 1783. He was invited to Malta by the grand master de Wignacourt to lay on water to the city from an inconvenient locality, an operation which he skillfully effected by an aqueduct above 9½ miles long, with underground channels to the houses, etc., affording a plentiful and pure supply; SAMPERI, *Messana Illust.*, 4to., Mess. 1742, i, 623.

MASUN (JOHN), of Bungay in Suffolk, was employed 1409 and 1423 to build Mettingham College, in that county, with its chapel; the interesting details of the accounts, 1402-1513, are given in *ARCHÆOLOGICAL JOURNAL*, 8vo., London, 1849, vi, 62-8.

MAT. A term derived from the French, signifying unpolished: as "mat gold", which is not burnished: or any work which does not reflect light, having lost its lustre. 5.

The last coat of internal painted work in the best rooms of good houses is flatted, the colour being mixed with turpentine to avoid a glarish effect.

MAT. For the due erection of buildings of any size at Victoria, Hong Kong, it is necessary to provide a mat for covering over the whole area to be built upon, and a little exceeding its dimensions, in order to protect the work from the very heavy rains which fall for six months in summer, and also the workmen from the weather and from the powerful influence of the sun. The details for doing this; and also the mode adopted by the Chinese in transporting heavy weights, are related by ALDRICH, in *Papers of the Corps of Royal Engineers*, 4to., London, 1849, x, 153.

MATARIYEH. A village near Cairo in Egypt, on or near the site of the ancient HELIOPOLIS.

MATAS (NICCOLA), professor at Florence, reduced the palazzo Ricci, now Ginori (formerly having a range of forked battlements), to its present form in 1826; and repaired 1835 the palazzo Fabbrini, now della Ripa. His chief works are the façade to the church of Sta. Croce; and a projected design for a façade to replace the old brick front of the cathedral of Sta. Maria; concerning which he published *Dimostrazione del progetto per compiere colla facciata l'insigne basilica di Sta. Maria del Fiore*, fol., Florence, 1843 (and with additions, 8vo., Florence, 1859); upon which a report (as s. v. FIRENZE) was issued by the Institute of British Architects, 29 November, 1847: the works were stopped by the revolutionary movements of 1847-8. He also wrote *Elogio che fu consacrato alla memoria di B. Peruzzi*, 8vo., Pisa, 1850. He died 14 March, 1872, aged 74, and was buried in the church of S. Peter at Ancona. *Sonetto all' egregio architetto*, by G. Rosini. MARONI, *Elogio*, 8vo., Florence, 1872.

MATCH-BOARDING. Thin boards or battens used for lining walls; it is similar to ploughed and tongued boarding, except that, by means of a pair of planes made on purpose, and called "match planes", the tongue is formed on one edge of each of the boards, and the groove in the other, like old mediæval joinery. The rebate is sometimes beaded. Boards are now grooved by machinery.

MATEO (EL MAESTRO). In 1161 he had built the bridge at Cesures in Galicia; and in 1163, king Ferdinand II of Spain issued a warrant (the original is given by CAEN BERMUDEZ) for the payment to him of an annual pension for life of a hundred maravedis (now worth about 8d. each, but relatively of a higher value) as master of the works at the cathedral at Santiago de Compostella in Spain; and, twenty years later, Mateo placed an inscription on the under side of the lintel of the western door recording the erection by him, of the triple portal, called the *portico de la Gloria*, a cast of which is now in the Architectural Court at the South Kensington Museum. It is considered by STREET, *Gothic Arch. in Spain*, 8vo., London, 1865, pp. 153, 489, to be "one of the greatest glories of Christian Art": illustrations of it are among the twenty photographs of the cathedral published by the ARUNDEL SOCIETY, fol., London, 1863.

ARCH. PUB. SOC.

MATERA. The chief town of a district in the province of Basilicata, in South Italy, and situated on the river Gravina. It is a place of great antiquity, and the residence of an archbishop, the see being in conjunction with that of Acerenza. The cathedral, dedicated to the Holy Trinity (?), is considered by FERGUSON, *Handbook*, 8vo., London, 1855, ii, 805, to be of almost equal importance with that at Bittonto, and other places near it, with this peculiarity that all the decoration has been lavished on the south front which faces the piazza; of the two entrances in this face, the eastern one is, as usual, the richest. One of the richly ornamented windows is given (dated 1270 in the second edit., 1867, ii, 255), showing how unlike the style is to anything in the North of Europe. The church dates probably about the year 1000; it is 180 ft. long, by 60 ft. wide, and the campanile 175 ft. high; though perhaps richer in decoration, this church appears to be smaller than most others of this district. The Corinthian columns of granite are said to have been brought from Metapontum. Three parish churches, fifteen monastic institutions, and fourteen smaller churches, are described in VOLPE, *Memorie Storiche ... di M.*, 4to., Naples, 1818, without plates; but very few of them now remain. The church of Sta. Maria d'Idria is excavated in a rock. 28. 96.

MATERIALS. The term used for the brick, stone, timber, iron, slate, glass, and other goods employed in the erection of a building. STRENGTH OF MATERIALS. CRUSHING WEIGHT. "Old materials" is the term applied to the above after they have been used in a building; when not very defective they are occasionally re-employed in new constructions of an inferior description. *Materials and their decorative treatment*, in *BUILDING NEWS Journal*, 1871, p. 71.

MATERIATIO. A term used in VITRUVIUS, iv, 2, and 7, and supposed to mean the whole timber work of a roof. The words "columen" and "culmen" are also used in the same chapter, but they generally mean a strut, prop or stay, though usually translated top, summit, or roof. FESTUS distinctly states, "columnæ dictæ quod culmen sustineant". It has also been translated a beam, as a collar beam, a ridge piece, and a wind beam. Culmen is the low Latin for the roof of a church or of a house; and so named from the Lat. *culmus*, a stalk or straw of wheat or other grain, the term having been first applied to thatched roofs. BEDE, in his *Life of S. Cuthbert*, says, *Culmina vero (habitu) de lignis informibus et feno superposit*; DUCANGE, *Gloss.* 19.

MATERNITY, see LYING-IN HOSPITAL.

MATHEMATICAL INSTRUMENTS. Instruments necessary for describing mathematical figures and for working mathematical problems. The instruments required by the land-surveyor are also placed under this designation; while those required by him for plotting, and by the architect, are usually termed DRAWING INSTRUMENTS. Amongst the former are the theodolite, the level, circumferentor, chain, tape, etc. SIMMS, *Treatise on the Principal Mathematical and Drawing Instruments*, 12mo., London, 1847; STANLEY, *Catalogue of Instruments*, 8vo., London, 1868, 8th edition; and his *Descriptive Treatise on Mathematical Drawing Instruments*, 8vo., London, n. d. The *Treatise* by BION, translated by STONE, 1723; 1758; by ROBERTSON, 1775; and by ADAMS, 1791, are old works on the same subject. BESSON, *Théâtre des Instruments Mathématiques et Mécaniques*, 10 plates, fol., Geneva, 1596, is now a rare publication.

MATHEMATICAL TILING. Where a small projection is carried out from an upper story over a beam, and the work is required to have the appearance of brickwork, it is formed of studs lathed and plastered, against which are secured thin bricks, or tiles, running the same courses as the bricks. The beam or girder should be of full strength, for if it should sag, the joints will break, and the work bulge and fall down. The rear of houses in London, built in the early part of the eighteenth century, and houses on the south coast, exhibit such work.

MATHEMATICS. That science which deals with numbers,

surfaces, and solids: their combination, resolution, and application. Mathematics, as respects what is necessary for the architect, is comprised in the work by GREGORY, *Mathematics for Practical Men*, 8vo., London, 1825: which work was enlarged 1847 by H. LAW; and revised in a fourth edition 1862 by J. R. YOUNG. The science is divided into—Part I, *Pure Mathematics*; comprising Arithmetic, including Logarithms; Algebra; Geometry; Mensuration; Trigonometry; Conic Sections; and Properties of Curves. Part II, *Mixed Mathematics*; Mechanics in general; Statics; Dynamics; Hydrostatics; Hydrodynamics; Pneumatics; Mechanical Agents; and Strength of Materials.

MATHEOS (MAESTRO) was succeeded 1528 on the works at the Batalha in Portugal, by J. de Castilho.

MATHEY (.....) the younger, designed 1829-30 the church at Crainvilliers; 1832 a fountain in iron at Liffol-le-Grand; and 1828 another fountain at Neuf-Chateau; all in the dep. Vosges; and are given in GOURLIER, etc., *Choix d'Edifices*, fol., Paris, 1837-44; ii, pl. 85; pl. 132; and pl. 84.

MATHEYS (HENRI) flourished between 1719 and 1752; and was also a sculptor. He completed in 1720-2 the abbey church of S. Pierre at Gand, by erecting the façade. SCHAYES, *L'Architecture en Belgique*, 8vo., Brussels, 1850-53, iv, 187. GOETGHEUER, *Mons. des Pays Bas*, fol., Ghent, 1827, p. 41, pl. 59 and 60.

MATHIEU (.....), was a member of the Academy of Architecture at Paris 1699, and died in 1732.

MATHIEU D'ARRAS or MATHIAS VON ARRAS, see ARRAS.

MA-THLOA. A wood of Amherst, East Indies, a species of *Artocarpus*. It is used for posts of houses. 71.

MATIAS (ALONSO), a Jesuit, resident as coadjutor in the province of Andalusia, had a taste so delicate for the time, as to suggest that he studied in Italy. He designed and directed works in the colleges of his Society at Montilla, Marchena, etc.; and in its house at Seville, to which he put a *retablo-mayor*, considered one of the best in the city. But still more celebrated was his *retablo-mayor* designed 1614, for the cathedral at Cordoba, which, after writing three memoirs, occupying pp. 357-368 in LLAGUNA, iii, upon the subject, he succeeded in having executed in jasper and bronze, whereas nearly all those in the other Spanish cathedrals were of gilt wood. He had an annual salary of 1500 reals, and another of 500 reals for dress, besides the expenses of his journeys to the quarries; but his official duties caused so much loss of time in the work commenced 1618, that he was superseded 19 March, 1626, by J. Aranda de Salazar, whose labours were finished 27 April, 1628; the *tabernaculo* was not completed till 1653 by S. Vidal in conformity with the original design by Matias. 66.

MATIENZO (GARCÍ FERNANDES DE), see FERNANDEZ de Matienzo (G.).

MATOS (JUAN DE), a Jesuit, and coadjutor in the province of Leon, continued the vast and magnificent college and church begun 1617 for his Society in Salamanca by J. Gomez; the upper part is inferior to the early work. 66.

MATRICE (COLA DELLA), or COLA DELL' AMATRICE, see FILOTESIO (NICOLA).

MATRONEUM. To the right of the Sanctuary in an ancient basilican church was the *matroneum* or place for the matrons, separated therefrom by a balustrade with a door opening upon the lower side into the place for the females. 51.

MATTEI (TOMMASO), a pupil of C. Fontana, designed at Rome the cappella Montioni in the church of Montesanto; the cappella Sabbatini in the church of Sta. Maria in Cosmedin; and the cappella Mattei in that of the Araceli; and also the winter choir as an addition to the same building; its plan is given in LETAROUILLY, *Rome Moderne*, 4to. and fol., Paris, 1850, p. 209, pl. 68. At Ferrara he repaired 1717-38 the palazzo dell' arcivescovo. 42.

MATTEO DA PINO or DA SIENNA, see PINO.

MATTEO ANTONIO (PAOLO DI), succeeded 1360 to A. di Cecco on the works at the cathedral at Orvieto. 67.

MATTEO (DOMENICO DI), was sent with Brunellesco and others 1429-30 to Lucca to assist in the fortifications; VASARI, *Lives*, 8vo., London, 1850, i, p. 461, note. It is probable he is the Domenico Stagnatio of DEL Rosso, one of the four artists who competed 31 December 1436 against Brunellesco for the lantern (executed 1443-56) of the cupola of Sta. Maria del Fiore at Florence. The following is the epitaph in the church of S. Niccolò at Pisa: "Hoc tumulo Magistri Dominici Magistri Mathei de Florentia Architectoris eximii sita sunt ossa, qui obiit A.D. MCCCCLXVI die vii Julii, quorum clauduntur Haeredes." GAYE, *Carteggio*, 8vo., Florence, 1839, i, p. 86-7 and 127.

MATTEO (SANO or ANSANO DI), called Sano di Matteo Castellano Montis di Montalcini, also a sculptor, was *capomaestro* of the works at the cathedral of Sta. Maria, and engaged on the works in the baptistry at Orvieto, 12 May, 1409. DELLA VALLE, *Storia*, 4to., Rome, 1791. CALDERARI, *Storia*, fol., Venice, 1813, i, 202. GAYE, *Carteggio*, 8vo., Florence, 1839, i, pp. 88, 100-1-2. 62.

MATTHEUS, was called in 1430 *kirchenmeister*, *werkman* zu Bern u. Uechtlande, and worked at Ulm: see ENSINGER.

MATTHIAS VON STEINBACH, see STEINBACH (E. VON).

MATTHIELLY designed 1732 the zeughaus or arsenal at Vienna. 14.

MATTING IN DRAWING, see HATCHING.

MATTIOLI (GIOVANNI), with M. Lottici, built 1727 the theatre at Gubbio in Italy. 96.

MATTOCK. An iron instrument with a wood handle, and resembling a pickaxe; it is used in laying the rails for lines of railways, stones, etc. One arm is pointed, the other formed to a wide edge for ramming in the earth under the sleepers, etc. Another form of mattock has both arms with wide ends, but one wider than the other. The two examples are given in BRES, *Railway Practice*, 4to., London, 1847, Ser. 3, pl. 8.

MAUCLERC (JULIEN), gentilhomme Poitevin; seigneur du Lignerion Maulec, La Brossardiere et Remanguis près Aspremont sur Vic, was in the service of king Henry IV of France (1589-1610). He compiled *Le premier livre d'Architecture*, fol., La Rochelle, 1600, the title-page of which work gives his portrait, and his age as 53 in September 1596; this may be the same work as *Traité de l'Architecture suivant Vitruve; ou il est traité des cinq ordres*, etc., 40 pl., fol., Paris, 1648. The former was translated into English by Robert Pricke, fol., London (1699), with 50 plates.

MAUDUIT (.....), was 1768 elected a member of the Academy of Architecture at Paris. He went 1808 to St. Petersburg; travelled in Greece and Italy from 1811 to 1813, returning to that city in 1814, where 1817 he restored the grand or imperial theatre, burnt 1810-1; the decoration does not exist; the front and portico (not destroyed) were by Dumot, called Tomon. Mauduit was one of the founders of the Comité des constructions de la ville de S. Petersburg, which corresponds with the Conseil des bâtimens civils at Paris. DUSSEIX, *Artistes Franc.*, 8vo., Paris, 1856, p. 425.

MAUGRAS of Lyon, continued 1652-60 the front of the church of N. D. de Bourg, and designed the clock tower. BAUX, *Bourg*, 8vo., Bourg, 1849, pp. 5, 147, 148.

MAUL. A large heavy hammer formed of wood, used by paviours to force stones down on their beds in street paving; and in laying York paving stones.

MAUPIN (SIMON), "architecte et ingénieur du roy", and architect to the city of Lyon in France. The place and date of his birth are unknown; but a *plan of Lyon* 1625, bears his name, and appears to be his first work. He was appointed *voyer* to the city 9 June, 1637; and in 1650 was allowed his son Ennemond as an assistant. He carried out 1646-55 the front with the campanile, 158 ft. high, of the hôtel de ville of the city: the first floor being damaged by fire 1644, was

MAUSOLEUM



R. Ballou

TOMB OF EL ISHTAR, BASTA, A.D. 181

March 25, 1812



restored by J. H. Mansart, who altered the exterior; DESJARDINS, *Monographie*, fol., Paris, 1863-7; GOURLIER, etc., *Choix d'édifices*, fol., Paris, 1837-44, iii, 37, pl. 321-4.

The drawings of the design accepted are signed "Simon Maupin, voyer de la ville, 14 July, 1646", and the words "Maupin invenit" occur on the medals and engraving of it: ROUYER AND DARCEL, 4to., Paris, 1863-6, i, 71. In 1654 he designed the works for the *rétablissement* of the old *digue* on the right bank of the river Rhone, facing the bastion of S. Clair; and in 1659 was appointed *intendant* of such works. He resigned his post of voyer 10 Dec., 1661, and was succeeded by his son. He was buried 10 Oct., 1668, in the church of the Jacobins, and may have died, therefore, on the 9th, about 65 or 75 years of age; DESJARDINS, pp. 8-9.

MAURESQUE ARCHITECTURE, not MORESQUE, is considered to be the more correct spelling, by GIRAULT DE PRANGEY, *Essai*, 8vo., Paris, 1841, p. 68; but the latter has been adopted in this work. ARAB ARCHITECTURE.

MAURICE, bishop of Paris, built, with the aid of the money produced by the sale of indulgences, the cathedral at Paris, as well as four abbeys: RAMÉE, *Hist. de l'Arch.*, 12mo., Paris, 1843, ii, 155.

MAURICE or MAURITIUS, bishop of London, 1085-1107 (BEDFORD, *Blazon of Episcopacy*, 8vo., Lond., 1858), commenced the rebuilding of the nave and transepts of St. Paul's cathedral after its destruction by fire. DUGDALE, *Hist.*, edit. by ELLIS, p. 4.

MAURICIUS was "ingeniator" 1186 at Dover Castle, when the *cingulum* was built. HARTSHORNE, *Sessional Papers*, Roy. Inst. Brit. Architects, 6 May, 1850.

MAURITANIAN, or AFRICAN MARBLE, is mentioned by GIBBON, *Decline*, etc., 8vo., London, 1854, iv, 324, as of a gold or saffron hue; quoting the description of the church of Sta. Sophia at Constantinople, by PAULUS SILENTIARIUS.

MAURITIA FLEXUOSA, or Carana palm, is used for thatching cottages on the banks of the Rio Negro. The cordage made therefrom is inferior to that made from the *Astrocaryum*. WALLACE, *Palms*, etc., 12mo., London, 1853.

MAURITIUS, Island of; supplies the esteemed black Ebony wood; see DIOSPYROS.

MAURO (ANTONIO), designed 1795 the interior of the new theatre at Udine, redecorated 1824 by G. Borsato. MANIAGO, *Udine*, 8vo., San Vito, 1839, p. 62.

MAUSOLEUM. The name given to an edifice usually detached, erected for the reception of the body of a deceased person, or to contain a tomb to his memory, but sometimes used as a sepulchral chapel. The term CENOTAPH is used when the body is not buried in such a structure. The term originated from the celebrated structure at HALICARNASSUS, built for the tomb of Mausolus, king of Caria, who died B.C. 353, by his sister and wife Artemisia. It was decorated by Scopas, Bryaxis, Timotheus, Leochares, and Pythis, and was accounted one of the seven wonders of the world. PLINY, xxxvi, 5. CAYLUS, *Essai in Mémoires de l'Académie des Belles Lettres*, xxvi. AULISIO, *De Mausolei Architecturâ*, 4to., Naples, 1694, and in SALENGRI, *Thesaurus*, iii. Many of the sculptures, including the statues of the king and queen, are now in the British Museum, having been discovered and brought to England after the researches in 1855-9 by C. T. NEWTON, *Discoveries*, etc., fol., London, 1862-3. TITE, *Observations on the recent discoveries*, in *Sessional Papers* of the Inst. of Brit. Architects, 1858-9; *Builder Journal*, xvi, 740; also xxi, pp. 1-3. Messrs. C. R. Cockerell (in FALKENER, *Classical Antiq.*, 8vo., London, 1851, vol. i), Lieut. Smith, Fergusson, with many others, have made suggested restorations of the building.

The mausoleum at Babylon, erected B.C. 325 by Alexander the Great in honour of Hephæstion, as described by DIONORUS, xvii, 15, appears to have been more magnificent. Those of Augustus and Hadrian at Rome, were also structures of great magnitude and grandeur; both were circular in plan. The

former stood in the Campus Martius; a restoration is given in HIRT, *Baukunst der Alten*, fol., Berlin, 1809. The latter is now the castello di S. Angelo; and its history is related by BURGESS, in *Sessional Papers* of the Institute of British Architects, 4 March, 1850; with a woodcut, by S. SMIRKE, from the bas relief supposed to represent it on the bronze door of S. Peter's; it is also given in CIVIL ENGINEER, etc., *Journal*, xiii, 153-7.

At Ravenna, to Theodoric, king of the Goths, who erected it for himself early in the sixth century (or by his daughter Amalasuntha). It consists of a chamber 30 ft. diam., having a domical covering of one piece of Istrian limestone, hollowed within to a depth of 10 feet, and nearly 36 ft. in diameter outside. SMIRKE, in the *Archæologia* of the Society of Antiquaries, xxiii, p. 323. MURRAY, *Handbook*. ISABELLE, *Les Edifices Circulaires*, fol., Paris, 1843-55, pl. 43-4. It was "built in his lifetime", as stated in an anonymous author (called the ANON. VALESII, because printed by VALESIIUS, in his edition of AMMIANUS MARCELLINUS), p. 671, and who says of it: "Se autem vivo fecit sibi monumentum ex lapide quadrato miræ magnitudinis opus et saxum ingentem quem (sic) superponeret (or super imponeret) inquisivit."

At Ravenna, to the empress Galla Placidia, now called the church of SS. Nazario e Celso, erected towards the middle of the fifth century—in the form of a Latin cross 46 ft. long and 39 ft. 9 in. wide.

The following among important structures of the sort are erected at the places named. At *Castle Howard*, the seat of the earl of Carlisle, by N. HAWKSMORE, and erecting at his death in 1736. DALLAWAY calls this "the earliest specimen of sepulchral splendour in England unconnected with an ecclesiastical building"; it was described by C. H. TATHAM, 4to., London, 1812. At *Wentworth House*, near Rotherham, for earl Fitzwilliam, by J. Carr, 1788, is given in STIEGLITZ, *Belle Architecture*, fol., Leipzig, 1800, pl. 61. At *Cobham Park*, Kent, for lord Darnley, by J. Wyatt, is also given in the same work, pl. 98; and in a small engraving by H. Repton, J. Peltro, sculp. in British Museum, the King's collection. At *Brookley Park*, Lincolnshire, for lord Yarborough, by J. Wyatt, said to have cost £30,000, published by TATHAM, fol., London, 1811: a perspective view in *ARCHITECT Journal*, 1850, ii, 138. At *Trentham*, Staffordshire, for marquis of Stafford (now Duke of Sutherland); ACKERMANN, *Repository of Arts*, etc., 8vo., London, 1824, iv, 7. At *Down Hill*, Londonderry, Ireland, by the earl of Bristol, to the memory of his brother, earl George William, who died 1775. NEALE, *Views*, 4to., London, 1823, Ser. i, vi, no plate. At *Frogmore*, Windsor, Berkshire, to the duchess of Kent, 1861, by A. J. Humbert, *BUILDER Journal*, xix, 531; and the Royal mausoleum at the same place to H.R.H. the prince Consort, by A. J. Humbert, of which the first stone was laid 15 March, 1862, and completed 1865. *BUILDER Journal*, 1862, xx, 213, 559; exterior 1863, xxi, 145, *et seq.*; interior 1870, xxviii, 606. At *Bow Wood*, Wiltshire, for lord Shelburne, before 1826. At *Blickling Park*, Norfolk, for John, second earl of Buckinghamshire, 1794-6, by J. Bonomi; given by W. PAPWORTH, *Memoir*, in *Sessional Papers* of the Inst. of Brit. Architects, 1868-9, p. 128. At *Rookby*, Yorkshire, about 1730-37, by Sir Thomas Robinson for himself; WOTTON, *English Baronets*, 8vo., London, 1771, iii, 99. At *Roehampton*, Surrey, for Mr. Lyne Stephens, by W. Burn, consecrated August 1864. At *Hamilton Palace*, co. Lanark, Scotland, 1852, by D. Bryce, after the Plaucian tomb near Rome; *BUILDER Journal*, x, 615; CIVIL ENGINEER, etc., *Journal*, 1851, xiv, 68; BURKE, *Visitations*, 8vo., London, 1852, Ser. 1, i, 263; and 1854, Ser. 2, ii, 207, s. v. Kinniel Park.

The chancel of Bunney church, Leicestershire, is stated to have been formed into a mausoleum, by the table being moved further westward.

Among the foreign examples may be noticed—At *Mehmoodabad* in Guzerat; the Roza or tomb of the vizier of

sultan Mahmood; GRINDLAY, *Architecture of Western India*, fol., London, 1826, part iv: a square surmounted by a dome, and surrounded by a double arcade supporting a corresponding row of smaller domes. At *Agra*, the celebrated Taje-Mahal, built by the emperor Shah Jehan in memory of his favourite queen Noorjehan, died 1631; designed by "Austin de Bordeaux, a Frenchman." These are examples among many of a similar class in Hindostan. Also the well known examples in Egypt, of which the tourbeh el sultan Martesseb at Cairo, is given in *Illustrations*, iii, Part I. At *Paris*, in the church of the Invalides, to the emperor Napoleon I, 1843-52, by Visconti; CHAUTARD ET LEJEUNE, *Tombeau de N.*, 12mo., Paris, 1853; that of Cardinal de Richelieu, in the church of the Sorbonne; and also of cardinal Mazarin in the church of the college founded by him. At *Charlottenburg*, near Berlin, to Louisa, queen of Prussia, by Hesse, but more celebrated for the recumbent figure of her by the sculptor Rauch; *BAUZEITUNG Journal*, fol., Vienna, 1844, pl. DCXIX. At *Dreux* in France, by king Louis Philippe for the Orleans family, shortly before his expulsion in 1850, and attached to the chapel of the castle.

Mausolée érigé à la mémoire immortelle de la princesse Isabelle infante d'Espagne, 3 pl., by Vander Hoorst, fol., 1633. JOLIMENT, *Les Mausolées Français dans Père la Chaise*, 4to., Paris, 1821-3.

MAUVE COLOR. Mauve dye, a recent discovery, is obtained from a remarkable substance called aniline, found in gas tar, but only in minute quantities. The great merit of the dye is the beauty and permanency of the tints which it imparts; its power of colouration is so great that a small quantity is sufficient for a large number of vats. *BUILDER Journal*, 1862, xx, 545, lecture by Dr. Hofmann. Its colour is that of the peach blossom.

MAVELIVERAM, MAVALIPURAM, see MAHABALIPPOORAM.

MAVROMATI. A modern village, consisting of about twenty huts, situated nearly in the centre of the ancient town of MESSENE in Greece.

MAWLEY (EDWARD), for many years surveyor to the commissioners for building new churches, in which office he was succeeded by J. H. Good, on his death 30 January, 1826. His son Henry adopted the profession.

MAXCANU, situated twelve miles from Jalacho, on the road to Uxmal, in Yucatan, is noticed by STEPHENS, *Incidents of Travel*, 8vo., New York, 1843, i, 210-20, for an extensive series of arched chambers like a maze, and called in Spanish "el laberinto", the passages of which he explored. They are constructed in a pyramidal mound, which has the ruins of a building on the top of it.

MAXIM. An axiom, a general principle, a leading truth. T. L. DONALDSON, *Architectural Maxims and Theorems in elucidation of some of the principles of Design and Construction*, 8vo., London, 1857. RAWLINSON, *Maxims in Masonry Construction*, read at the Liverpool Architectural Society, 27 July, 1858; and reprinted in *BUILDER Journal*, xvi, 131, which also gives STREET, *Right Use of Ancient (Medieval) Examples*, 156-7; and also SMIRKE, *Lecture on Architecture at Royal Academy*, 1858, pp. 101 and 121; also 162. A series of *Architectural Maxims* is given in LONDON, *Architectural Magazine*, 8vo., London, 1834-5, i and ii.

MAXIMIN (SAINT). A town situated about twenty-two miles north of Toulon in France. It still retains the ancient walls, and has a church of the thirteenth century, one of the finest examples in that country of the style of that period.

In the neighbourhood are extensive stone quarries, which were reported upon in *An account of the quality of the stones employed at Paris*, ordered to be made July 1678 by Colbert, surintendant des batiments. Sections of the quarries at Trossy (the carrières Foigné on Legros, and of Parain) are given in DALY, *Revue Générale*, 4to., Paris, 1852, x, 238-9, and of Pageot, and carrière Neuve, in pl. 13.

MAY (BAPTIST). The following notes may apply to one or more of this name. He was appointed, Aug. 1660, registrar in the Court of Chancery; and was, 1665-67, etc., keeper of the privy purse. He had a grant Sept. 23, 1664, of several parcels of ground in Pall Mall, etc., for building thereon a square of thirteen or fourteen great and good houses; CALENDAR OF STATE PAPERS, *Domestic Series*, pp. 15, 162, etc. With Evelyn (*Diary*, 8vo., 1850, ii, 53) and Sir Peter Lely, he recommended G. Gibbons, Jan. 1670-1, to king Charles II; WALPOLE, *Anecdotes*, 8vo., London, 1849, p. 553 (perhaps an error for HUGH May). He was clerk of the works under Sir C. Wren, at Windsor Castle; his portrait is said by WALPOLE, p. 468, to have been introduced on the ceiling of S. George's Hall, by A. Verrio, representing him in a periwig, as a spectator of Christ healing the sick. In 1690 he was returned, with Sir C. Wren, member of Parliament for Windsor, but the election was annulled; TIGHE AND DAVIS, *Annals*, 8vo., London, 1858, ii, 449. FISHER, *Tombs in S. Paul's*, 4to., London, 1684, p. 103, mentions Baptist May of Whitehall as one of the family of the Mays of Hampshire and Sussex. That a Baptist May lived at Hammersmith, adjoining to the High bridge; was a trustee in 1739 of the pews of the church there; that the front of his house is shown in a print by Major, published 1750 after a painting by Fayram; are recorded in FAULKNER, *Hammersmith*, 8vo., London, 1839, p. 321.

MAY (HUGH), born 1622, followed the school of Palladio. He was appointed, June 1660, paymaster of the king's works, with a fee of 2s. per day, and 2s. riding charges. CALENDAR, etc., *Domestic Series*, 1660, *et seq.*; and was one of the commissioners for the repairs of old S. Paul's cathedral. He designed, about 1665, Berkeley House, Piccadilly, for John, Lord Berkeley of Stratton, who died 1678; it is said to have cost near £30,000; the staircase was of cedar; EVELYN, *Memoirs*, 25 Sept. 1672, and 12 June, 1684. (It was burnt Oct. 16, 1733, and rebuilt for the third duke of Devonshire, by W. Kent; THE DAILY JOURNAL, 17 Oct., 1733.) PEPYS, *Diary*, 21 March, 1669, records his meeting with "Mr. May, who tells me the story of his being put by Sir John Denham's place, of surveyor of the king's works, who, it seems, is lately dead, by the unkindness of the duke of Buckingham, who hath brought in Dr. Wren. He tells me the king is kind to him, and hath promised him a pension of £300 a year out of the Works, etc." EVELYN, *Memoirs*, March 1671, notices his being the architect employed at Windsor Castle, while Sir C. Wren was the surveyor; TIGHE AND DAVIS, *Annals of Windsor*, 8vo., London, 1858, ii, 320. He designed 1677 Cashiobury, Hertfordshire, for the earl of Essex, a plain fabric; the description of it by EVELYN, *Memoirs*, 18 April, 1680, is copied in BRITTON, *Cassiobury*, fol., London, 1838, p. 16, with plan and elevations. He also designed Sir Stephen Fox's house at Chiswick, which EVELYN, 30 Oct., 1682, complains of as being "somewhat heavy and thick".

A brass $7\frac{1}{4}$ ins. by 6 ins. on the south side of the chancel of Mid Lavant Church, Sussex, describes him as "Comptroller of the Works to King Charles the Second, Comptroller to the Castle of Windsor, and by his Majesty appointed to be sole Architect in Contriving and Governing the Works in the Great alterations made by his Majesty in that Castle. Dyed the 24th day of February 1683 in the sixty-second year of his age." Other brasses record the deaths of members of his family. *BUILDER Journal*, 1853, xi, 584, 645. He was succeeded at Windsor by Sir C. Wren: ELMES, *Wren*, 4to., London, 1823, fol. 433-4.

MAYAM. A wood of Tavoy, East Indies, described as an indestructible, strong, heavy wood, dark red in colour. 71.

MAYAPAN, is situated ten leagues south of Merida in Yucatan. The ruins cover a great plain, having a circumference of three miles, the remains of a strong wall being traced in the woods. Among them is a mound, 100 ft. square at the

base, and 60 ft. high, with a stone platform 15 ft. square at the top; also an edifice 25 ft. diam. on the summit of another mound. The destruction of this place occurred about 1420, or about 270 years after its foundation. STEPHENS, *Yucatan*, 8vo., New York, 1843, i, 132-141; ii, 279, with woodcuts. WALDECK, *Yucatan*, fol., Paris, 1838, pp. 23, 44.

MAYENCE, in Hesse Darmstadt; see MAINZ.

MAYHEW (JAMES GRAY), was born 8 Feb., 1771. He exhibited designs at the Royal Academy of Arts in London in 1792 to 1796; but his practice consisted chiefly in the supervision and restoration of buildings under his respective appointments of District Surveyor of the parish of St. James, Westminster, from 1823, and of surveyor to the Westminster Fire Office from 15 March, 1798, till his death 24 March, 1845, aged 75. G. M.

MAYNARDUS, see MAINERIUS.

MAYORALTY. The official residence or place of business of the mayor of a town, village, or department. The MANSION House of the city of London is perhaps the chief example of such a residence, which also contains his court of justice and cells for prisoners. A French *mairie* for a small commune is given in MONITEUR DES ARCHITECTES, vol. viii. The *mairie* de Vincennes, by Clerget, is illustrated in 19 pl., by CALLIAT, *Encyclopédie d'Architecture*, iii, and also, iv, the *mairie* du xime. arrondissement of Paris, by Rolland; and viii, of Batignolles-Monceaux. Other examples are given in NARJOUX, *Arch. Communale*, 4to., Paris, 1870.

MAY-RANG. The native name of a wood of Tavoy, East Indies, said to be very durable, and to be used for the posts of houses on the banks of rivers. 71.

MAYRE (ODOR), *faber murarius*, was a native of Dôle, in Burgundy. He repaired 1614 the windows of the belfry of the church at Brou, with stone of "Ramasse". BAUX, *Eglise de Brou*, 8vo., Brou, 1844, pp. 273-4.

MAYTOBEK. A wood of Tavoy, East Indies, used for the bottoms of ships, and said to be preferred to teak. 71.

MAY WOOD. A furniture wood of rather plain character, varying in appearance from that of satin wood to the lightest mahogany.

MAZABAL or MASABEL (BLAS DE), a Biscayan, was appointed, 9 December, 1606, maestro-mayor to the cathedral at Cordova, with an annual salary of 40,000 maravedis, and 4 reals per day while so employed. His design for the retablo-mayor was rejected with others for one by A. Matias, commenced 1614; but he designed 1612 the catafalque for the obsequies of queen Margaret; and was succeeded by S. Vidal. 66.

MAZE. Under this heading is given an account of the labyrinthine figures observed in some mediæval churches, and also in gardens. To thread a maze was considered a compensation for a pilgrimage to Jerusalem; it was performed on the knees as a species of penance, and required about an hour or more, according to the size of the maze. VIOLETT LE DUC, *Dict., s. v. Labyrinthe*.

A maze in the church of the abbey of *S. Bertin* at *S. Omer* formerly existed in the pavement of the south transept; the squares were of white or yellow for the light coloured, and black or blue for the dark, stones forming the figure. On a drawing of it, dating about 1714, at the bottom, were the words "entrance of the road of Jerusalem." WALLEY, *Descr. d'une crypte et d'un pavé mosaïque*, 4to., *S. Omer*, 1843. In *Amiens* cathedral there was an octagonal example about 41 feet across; it was formed about 1288, and destroyed 1825. Between the arms of the cross were represented the three architects of the church and the bishop Evrart, with an inscription in French verse. The central octagon slab, 4 ft. 2 in. in diameter, of blue shaly marble, is now in the museum of the town. DAIRE, *Histoire de la Ville d'Amiens*, 4to., Paris, 1642; edit. 1757. That at *S. Quentin* is identical with the following one; it is 34 ft. 6 in., or 35 feet diameter, and placed at the entrance;

it is figured in *Illustrations*, Part I, 1867. *Arras*.—This, which is placed in the nave of the cathedral, is also octagonal, about 34 ft. 7 in. diameter, and is composed of blue and yellow squares. (DEBRAY) *Hist. de Cath. d'A.* At *Reims* the maze was also in the nave of the cathedral; it was destroyed 1778. In the centre was the figure of the architect, and at the angles those of the four masters of the works. It was about 36 ft. 3 ins. wide, and each band a foot broad. GERUSEZ, *Descr. Hist., etc., de Reims*, 8vo., Reims, 1817; also CERF, *Hist., etc., de N. D. de Reims*, 8vo., Reims, 1861, i, 77. The example in *Chartres* cathedral still exists; it is placed very nearly in the middle of the nave, as shown in the plan given in WINKLE, *French Cathedrals*, 8vo., London, 1837. It is about 42 ft. 6 in. diameter; the outer line is scalloped and wider than the interior lines, which are plain; and the centre forms a circular figure with six scollops. It is figured in *Illustrations*, Part I, 1867.

Among the foreign examples, CIAMPINI, *De Sacris Edif.*, cap. iv, 129, and MURATORI, give the ancient mosaic pavement in the church of *S. Michele* at *Pavia*, containing a maze within a semicircle, the guilloche of which is identical with those of *Amiens*, *S. Quentin*, *Arras*, and *Chartres*, although they are distributed in octagons or circles, and are more recent by many ages. The example at *Lucca*, incised on one of the piers of the porch of the cathedral, and about 19½ ins. diameter, is figured in *Illustrations*, Part I, 1867. AMÉ, *Carrelages émaillés du moyen âge, etc.*, 4to., Paris, 1859, gives a history of *Labyrinths*, illustrated by many of the examples herein noticed.

There were others at *Canterbury*, at *Poitiers*, in the chapter house of *Bayeux* cathedral, at *Bayeux* representing four architects, at *Aix*, at *Sens* destroyed in 1768 (given in GAILHABAUD, *Arch. du Moyen Âge*, etc., 4to., Paris, 1850-9; and WILLEMIN, *Mon. Inédit.*, pl. lxxxiii, p. 53), at *S. Maria* in *Aquino*, and at *S. Maria* in *Trastevere*. One formed in four small tiles is given in the work by AMÉ, from the abbey of *Toussaintes* (*Marne*). The maze was introduced into Belgium in the thirteenth century, according to SCHAYES, *L'Arch. en Belgique*, 8vo., Bruxelles, 1850, iii, 120.

Besides these examples, there are a number of interesting specimens in England formed on the turf of various greens; they are described in an interesting paper as mazes by TROLLOPE, in the *Archæological Journal*, 1853, xv, 216-35, and subsequently in the *Reports and Papers* of the Associated Architectural Societies, iv, 251 (condensed in *BUILDER Journal*, 1858, xvi, 690), with cuts, which are also given in *Illustrations*, Part I, 1867: they comprise those at *Alkborough*, *Lincolnshire*, 60 ft. diam.; *Ripon Common*, *Yorkshire* (now destroyed), 44 ft. diam.; *Wing*, *Rutlandshire*, 40 ft. diam.; *Boughton Green*, *Northamptonshire*, 37 ft. diam.; the *Mize* Maze on *S. Catherine's Hill*, *Winchester*, 86 ft. square; at the old palace at *Theobalds*, *Hertfordshire*, also square; at *Saffron Waldon*, *Essex*, circular, with recesses at the four corners, 110 ft. diam.; and at *Sneinton*, *Northamptonshire* (near *S. Anne's Well*), 51 ft. diam.; and, lastly, one of a triangular form, now destroyed, at *Pimperm*, near *Blandford*, *Dorsetshire*. A maze about 4 miles from *Hull*, only a few yards distant from the river *Humber*, known by the name of the "walls of *Troy*", is a dodecagon of 40 ft. diameter, formed of grass walks, each about 14 ins. wide, the intervening space being dug out to a depth of 6 ins.; the plan is given in ACKERMANN, *Repository of Arts, etc.*, 8vo., London, 1815, i, 193. NICHOLS, *Illustrations of the Manners, etc., of ancient times in England* (Accounts of churchwardens of *S. Margaret*, *Westminster*), 4to., London, 1797, gives the extract, "1672. Item to Mr. William Brewer for making a maze in *Tuttle fields*, £2:0:0." The maze at *Saffron Waldon* above mentioned is stated to be 110 ft. through one way, and 130 ft. the other, the continuous path amounting to about a mile in length; in 1699 the corporation paid 15s. for recutting it, which is done about every

twenty-five years. It is very similar to Robin Hood's race, near Nottingham, though a better specimen. NOTES AND QUERIES *Journal*, 3 Ser., x, 4 Ser., ii and iii, name other examples.

The maze sometimes formed a fanciful feature in pleasure grounds attached to palaces; as the one designed by Le Notre at Versailles, another at Choisy le roi, and the one at Hampton Court palace (a plan is in the British Museum, *Addit. MS.* 6341, fol. 1), which were formed of intricate and interlacing lines of pathways, lined by dense rows of high shrubs. BLONDEL, *Cours*, 8vo., Paris, 1773 (i, 17, ancient labyrinths), and iv, 43, 72, illustrates pl. xviii, the one at Choisy, designed by Gabriel; and pl. xix that at Chantilly, by Le Notre, who designed many others. SERLIO, *The Five Books of Arch.*, fol., London, 1611, describes, in book iv, the laying out of mazes consisting of plans inscribed in squares. Also, CAUSE, *Koninglyche Hovenier*; and COMMELYN, *Nederlantse Hesperidis*, fol., Amst., 1670-76. The latest example in England is that in the Horticultural Gardens at South Kensington, constructed at the express desire of the Prince Consort.

MAZERSCOWRER. A term used in England in the first half of the seventeenth century, for a workman who cleared drains, leveled ground, removed deals, helped plumbers, wheeled away rubbish, and performed such like work, and was paid 2s. per day. He was above the "labourer", who was paid 16d. per day. *Works at Whitehall*, 1660; Brit. Mus., *Addit. MS.* 1656, fol. 32a, 94b, and 127.

MAZIN (. . .) born 1686 at Marseilles, became ingénieur et directeur des plans du roi, and chevalier of the order of S. Louis. He designed the hôtel de Charost, faubourg S. Honoré, at Paris; and the very large château d'Asfeld in Champagne, built of chalk, for the marshal marquis d'Asfeld. He died 1739. His son Mazin de Luzard, born at Toulon, succeeded to his employments. BLONDEL, *Arch. Franç.*, fol., Paris, 1756, iv, 20. 5.

MAZMORRA. The Spanish name for an excavation, lined with a cement like the Moorish water tanks, in which grain could be preserved for more than fifty years; it was usually made in secret places, as noticed in MURRAY, *Handbook for Spain*, 1869, in examples at p. 361 Granada; p. 380 Alcala de Guadaya; and p. 442 Tortosa. GRANARY.

MAZOIS (FRANÇOIS), born at Lorient, 12 Oct., 1783, was educated at the central school at Bordeaux, and was admitted into the Polytechnic school. An incurable deafness preventing his joining the army, he became at fifteen a pupil of Percier at Paris. His fortune enabling him to travel, he accompanied A. F. R. Leclère in 1808 to Rome, where he studied the antiquities. King Murat invited him to Naples to assist in embellishing that city, where he restored the palais royal at Portici. The excavations at Pompeii attracting his attention, he measured and drew them for the publication *Les ruines de Pompei pendant les années 1809, 10 et 11*, fol., Paris, 2 vols., 1812, and 1824, consisting of 20 parts which had appeared at his death; it was continued by GAU, vols. 3 and 4, 1829 and 1838, which latter contains a memoir of Mazois. He next investigated the remains at Pæstum.

These labours occupied about twelve years, after which he returned to Paris, where he designed four houses in the Champs Elysées; the passage Choiseul, the passage Saucède, etc.; also alterations to the archbishop's palace at Reims. For Louis XVIII he designed (1816) the restoration and interior decoration of the church and monastery of Sma. Trinità de' Monti at Rome built for Charles VIII (VAST, p. 272); and various improvements in the French ambassador's residence in that city. He then wrote *Le Palais de Scaurus, ou description d'une maison Romaine*, 8vo., Paris, 1819; 1822; and also in 1859 with a memoir by VARCOLLIER, enriched by original materials found among Mazois' papers. BUILDER *Journal*, xviii, p. 110, gives from it an interesting letter respecting the late C. R. Cockerell. He edited an edition (perhaps the fourth) of BULLET, *Architecture pratique*, 8vo., Paris, 1834; contributed a number of biographies

to the GALERIE FRANÇAISE; and wrote a variety of papers on archaeological subjects, among which were *Considérations sur la forme et la distribution des Théâtres antiques*, for vol. i of LEVÉE AND LE MONNIER, *Théâtre*, 8vo., 1822. He was also preparing *Mémoires sur les Embellissemens de Paris depuis 1800*, etc.; and had prepared the material for a work *Sur les ruines de Pæstum, de Pouzzoles, et d'Herculeum*, etc., being a sequel to the above on *Pompeii*. He died of apoplexy at Paris, 31 Dec., 1826. 110.

MAZOLI (BASILIO), was professor of the Academy of Fine Arts of S. Luke at Rome. Early in 1815 were deposited in that Academy four drawings by him, three of which represented the plan, with exterior and interior views, of the monument proposed by that artist, which, by the direction of the English consul-general Fagan, was to be erected at Rome, in everlasting memorial of the triumph of religion; as noticed in ACKERMANN, *Repository of Arts*, etc., 8vo., London, 1815, i, 161.

MAZONERIA. A general name used in Spain and Portugal to denote Pointed Architecture; see CRESTERIA. LLAGUNO, i, p. 15. 66.

MAZUECOS (PEDRO DE), designed two bridges in Andalusia over the river Guadalquivir; one, the puente del Obispo, was erected 1505-18; the other retains its designer's name as the ponte de Mazuecos. 66.

MAZUECOS (PEDRO DE), possibly of the same family, was father of Cristobal Garcia, a cabinet-maker, and of Pedro Garcia, hereafter named. He was maestro-mayor of the works at Burgos and Tordesillas; and as successor to J. de Salamanca, 1574, at Valladolid, and also 1 August, 1578, at Simancas, where he executed the designs prepared by J. de Herrera and F. de Mora. The date of his death is not known. 66.

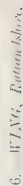
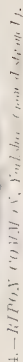
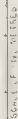
MAZUECOS (PEDRO GARCIA DE), carried out the designs furnished by F. de Mora, for the interior of the salone called the "Estado de Italia" at Simancas, 1589; and after assisting his father at Burgos Tordesillas, was resident 1604 at Valladolid, where the iglesia de las Agustinas, finished in that year in that city, is attributed to him. On application of his father he seems to have been allowed to hold, even during his parent's lifetime, the posts of maestro-mayor for the *archivo* of Simancas, the *casas reales* of Valladolid and its environs, the town of Tordesillas, the royal court of the Franciscan monastery at Abrojo, of the castle of Burgos, and of the casa de La Quemada. In 1605 he succeeded, with a salary of 60,000 maravedis on condition of visiting the works six times in the year, to A. de Segura in the same capacity, on the works of rebuilding the church and monastery of the order of Santiago at Uclés in Castile; he was promoted 4 April, 1607, in succession to D. Sillero, as *aparejador* of the alcazar at Madrid, the palacio del Pardo, and the casa del Campo. He died in October 1609, and was succeeded at most of his works by P. de LIZARGARATE. 66.

MAZZANTI (FRA ALBERTINO), born 1260 at Florence, was son of Cambio, and took 1284 the Dominican habit in the monastery of Sta. Maria Novella; the work of the new church commenced 1279 by fra Sisto and fra Ristoro, was continued, after their departure 1280 to Rome or after the death 1283 of fra Ristoro, by Mazzanti, with the assistance of fra Borghese, whom he outlived about six years; the eastern aisle is assumed to be their work. He died 1319. 87.

MAZZARA (the ancient Emporium). A town in Sicily, twenty-five miles south of Trapani, and situated on the river Mazara or Salemi; it still retains the walls flanked by small towers, and a citadel at the south-west angle, built by the Saracens when they landed in 826 or 827, and conquered the island. The cathedral, dedicated to the Transfiguration of the Saviour, has a good dome, and three old tombs. There are several other churches, a bishop's palace, and other public edifices. 50. 96.

MAZZARELLI (FRANCESCO), practised at Ferrara, where he reformed 1637 the presbiterio of the cathedral; his design

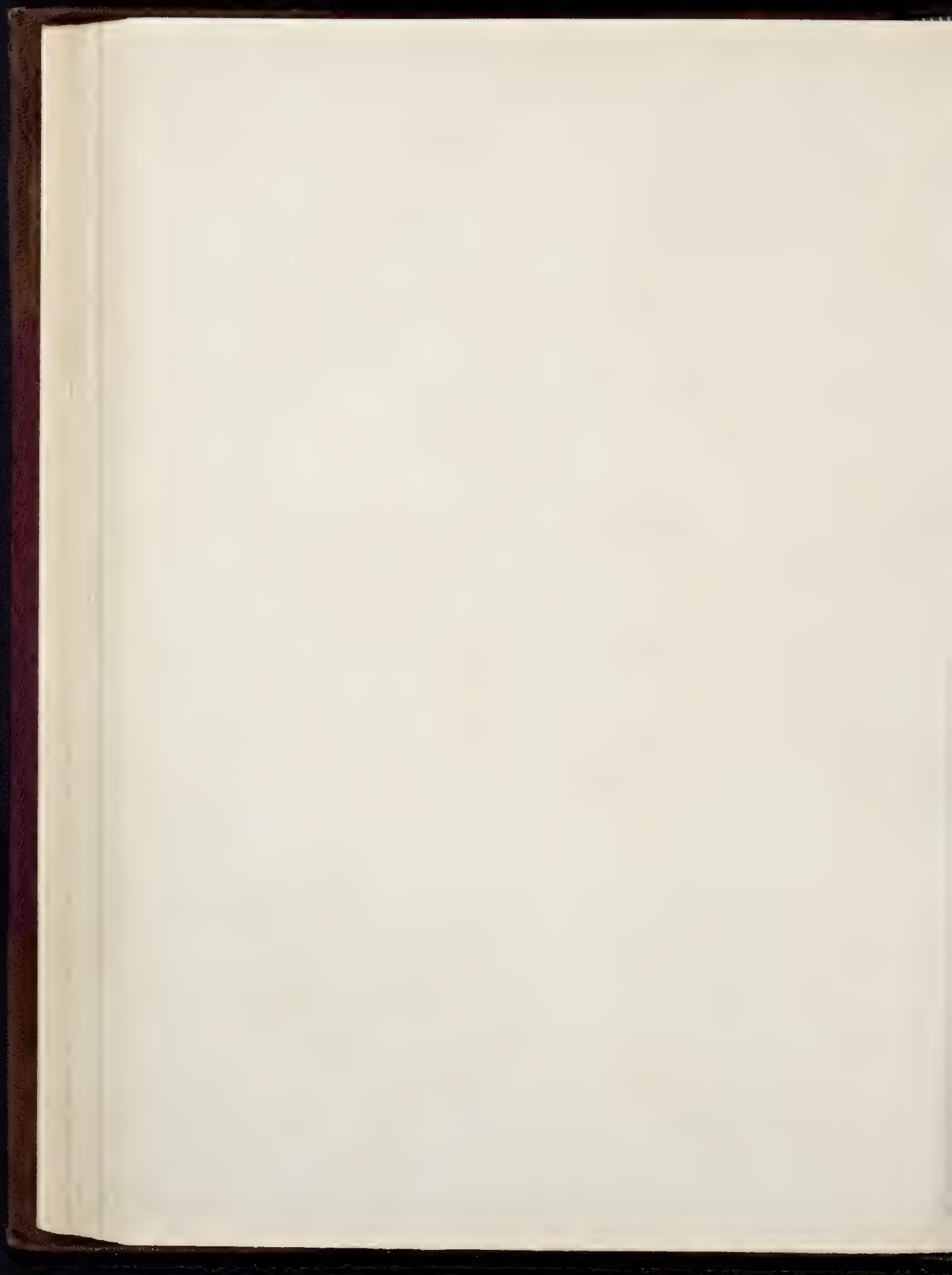
Entrance of Parish Church.



Printed from the blocks in the possession of Rev. Edward Frothingham, F.R.S., at the request of Mr. W. W. Phelps, his kind representative.

1. *LOCAL CATHODAL*. Increase in one of the P_{CATH} of the P_{CATH} .

[illegible]





9.—SAFFRON WALDEN, Essex.

100 YARDS.

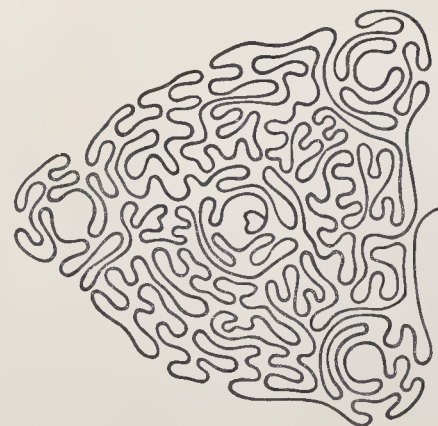


8.—SWEATON, Northamptonshire (near S. Wootton Bassett).

100 YDS.

50 YDS.

100 YDS.



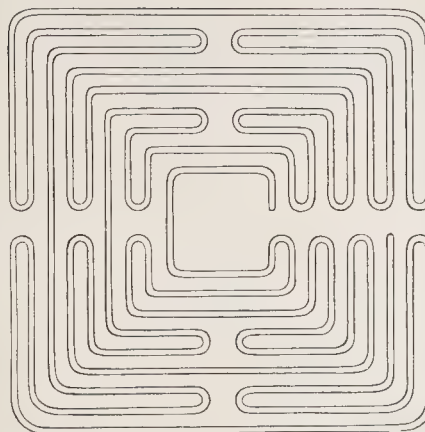
10.—PLIMMER, near Blunham, Dorsetshire (now destroyed.)

Printed from the blocks in the possession of Rev. EDWARD TROLLOPE, F.S.A., Archdeacon of Stow, by his kind permission.



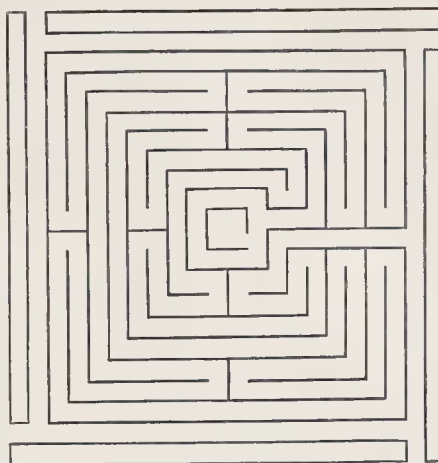
7.—BOUGHTON GREEN, Northamptonshire.

100 YARDS.



11.—WYNTON, The Mere near St. Catherine's Hill.

50 YARDS.



12.—THEOBALDS, Northamptonshire (at old Palace).

Printed by THOMAS DODD, 18, St. Paul's Churchyard, London.



was continued upon one-third of the church 1711; and the remaining two-thirds were completed for consecration 15 Sept., 1728; designed the church of Sta. Apollonia de' Francescani 1662, completed 16 March, 1692; that of SS. Cosmo e Damiano, carried out by the Santinis, 1710-38; an arch of the Passeggio to the strada della Giuvella, 1705; and the façade of the church of S. Giorgio in the suburbs, 1714, in which he was assisted by G. Bottoni.

MAZZEI (BRUNO DI SER LAPO), was one of the four artists who presented, 31 December, 1436, designs in competition with Brunellesco (LAPI, p. 22) for the lantern executed 1443-56 of the cupola of Sta. Maria del Fiore, at Florence. DEL ROSSO, *Metrop. Fiorentina*, 4to., Florence, 1820, p. 12.

MAZZETTO (FRA), took 1298 the Dominican habit in the monastery of Sta. Maria Novella at Florence; about 1300 he was entrusted with the completion of the church of S. Domenico at Prato, after it had been quitted by Fra P. Pilastri. He died there 11 October, 1310, and the works to the monastery and church were not finished in 1322, although VASARI makes Giovanni da Pisa restore the monastery in 1300. 87.

MAZZONI (GIULIO), of Piacenza, was a pupil of Daniel de Volterra, and better known as a sculptor. He designed 1565 the palace for the cardinal Girolamo Capo di Ferro, in the piazza Capo di Ferro at Rome; FERRERIO, *Palazzi*, fol., Rome (1655), pl. 30-31 (or 32-3). It passed to the family Mignanelli, and cardinal Bernardino Spada employed Borromino to restore it in 1632; LATAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 527, and iii, pl. 243-6.

MAZZONI (SEBASTIANO), designed the palazzo Lin a S. Samuele on the grand canal at Venice; given in CARLEVARI, *Venezia*, fol., Venice, 1703.

MEAD (JOHN CLEMENT), born 3 April, 1798, was the son of a surveyor, in whose office it is probable he received his education, or in that of his relation Mr. Kemshed, also a surveyor; he attended the antique school of the Royal Academy of Arts in London as early as 1815; and obtained 1829 the second premium in the competition between eighty-nine architects for the new general post office, London, drawings of which he exhibited 1824 and 1826 at the Royal Academy. In 1825 his design for the new dining hall of the Salters' Company was selected in competition (but one by H. Carr was carried out); he competed 1823 for the completion of King's College, at Cambridge; and 1821-4 designed and erected the observatory in that town, at an expense of £18,000; it is described in WEALE, *Pict. Handbook to London*, 8vo., London, 1851, pp. 670-2. Among other domestic works he designed 1827 the premises of Messrs. Rundell and Bridge on Ludgate Hill. His travels were limited to England and some parts of France, where he was much engaged in work, and became interested in the system of abat-toirs, and also in the casting of works of art in bronze. He died, after a protracted illness, 15 January 1839, aged 41 years, and was buried at Piddletrenthide, in Dorsetshire, to which place he appears to have retired on his marriage in 1831; leaving a widow and three sons.

MEANDER, properly MEANDER.

MEANWOOD STONE. The quarries are situated near Leeds, and supply a sandstone from the millstone grit formation, varying from a somewhat fine crystallization to a rather coarse conglomerate enclosing both angular and rounded pieces of quartz with argillo-silicious cement, slightly micaceous, and sometimes containing a few ferruginous specks. The colour is a light yellowish brown. The stone has been extensively used in the royal dockyards, and in the pier at Dover; for heavy copings of retaining and parapet walls, as well as for foundations of heavy machinery, being equal in strength and durability to the best BRAMLEY FALL STONE, from which it does not differ in composition. The Commissioners' *Report on Stone* for the Houses of Parliament, gives the weight per cubic foot at 140 lbs.; with beds from 2 to 10 ft. thick; blocks of great size can be obtained up to twelve tons' weight for general

building purposes. The original Bramley Fall quarries being nearly exhausted, this stone is now taking its place in preference to granite, which is more expensive, or to a reddish coloured ferruginous gritstone quarried near to them.

MEASON. A term used in the contract for the marble work of the tomb of Richard II and Anne, given in RYMER, *Fœdera*, and GOUGH, *Sep. Monts.*, and translated *maison*, or the tabernacle for an image, by WILLIS, *Arch. Nomen*, 4to., Camb., 1844, § 92.

MEASURE, THE, or module, or scale, upon which mediæval churches were designed, had best be considered *s.v.* PROPORTION, as the length, breadth, and height, would all follow the consideration of the scale or dimension used.

MEASURE. In geometry, strictly a magnitude or quantity taken as a unit, by which other magnitudes or quantities are measured. It is defined by EUCLID as that which, by repetition, becomes equal to the quantity measured. It is also the unit or standard by which extension is to be measured; there are measures of length, of superficies, and of volume or capacity: the two latter are always deducible from the former, whence it is only necessary to establish one unit, namely a standard of length. The choice of such a standard, definite and invariable, modern science has accomplished. The former rude measures, such as the foot, cubit, span, fathom, barleycorn, hair's breadth, cannot now be mentioned in matters of science, much more precise standards having been found, and not susceptible of casual variation. Nature affords two or three elements, which, with the aid of science, may be made subservient to the acquisition of the knowledge required. The earth being a solid of revolution, its form and magnitude may be assumed to remain practically the same in all ages. If this be so, the distance between the pole and the equator may be taken as an invariable quantity; and any part, say a degree, which is a ninetieth part of it, will be constant, and furnish an unalterable standard of measure. So, again, the force of gravity at the earth's surface being constant at any given place, and nearly the same at places under the same parallel of latitude, and at the same height above the level of the sea, the length of a pendulum making the same number of oscillations in a day is constant at the same place, and may be determined on any assumed scale. Thus there are two elements—the length of a degree of the meridian, and the length of a pendulum beating seconds. Others have been suggested, but these need not be entered upon in these pages. 1.

MEASURE OF LENGTH OR LINEAR MEASURE. In all measures of length an immutable standard has to be found. The YARD is the one which in England has been from early times attempted to be correctly produced: "one measure throughout the land" was ordained as early as Richard I, 1197; to that article reference can be made for notice of the standards at various periods. A good machine for testing lineal measures is given in BUILDERS' *Journal*, xii, 664, and xiii, 11.

When the student has read PENROSE, *Investigation*, fol., London, 1851, he will learn the difficulty of believing the correctness of a good scale, however carefully packed, if it has been conveyed to any considerable distance; and with the help of the articles Acre, League, Mile, Standard, and Weight, in the PENNY CYCLOPÆDIA, he will see that little dependence can be placed upon the opinion of previous observers with regard to the foot in early times. As stated *s.v.* FOOT, the variation of the length of the English standard, renders it unnecessary to perpetuate in this work old calculations of the English length corresponding to foreign foot measures; such tables will be found in the publications annexed; perhaps one or two may state the standard upon which the calculations are based. A Parliamentary Return about April 1864 contains a useful report by Mr. Chisholm, chief clerk in the office of the comptroller general of the exchequer, on *The Exchequer Standards of Weights and Measures*, and their variations; other Reports on the subject have been issued by The Standards Commission.

IMPERIAL LINEAR OR LONG MEASURE.

| Inches. | Feet. | Yards. | Poles. | Furlongs. | Miles. |
|---------|-------|--------|----------|------------|--------------|
| 1 | 0.083 | 0.028 | 0.005205 | 0.00012626 | 0.0000157825 |
| 12 | 1 | 0.333 | 0.060606 | 0.00151515 | 0.00018939 |
| 36 | 3 | 1 | 0.1818 | 0.00545 | 0.00056818 |
| 108 | 9 | 3 | 0.545 | 0.01635 | 0.00170455 |
| 1296 | 108 | 36 | 6.75 | 0.1635 | 0.0204375 |
| 1728 | 144 | 48 | 9 | 0.218 | 0.02732 |
| 20736 | 1728 | 576 | 108 | 2.18 | 0.2732 |

The English pace is equal to $1\frac{1}{2}$ yards or equal to 5 feet.

IMPERIAL SUPERFICIAL OR LAND MEASURE.

| In. | Sq. feet. | Sq. Yards. | Sq. Poles. | Sq. Rods. | Sq. Acres. |
|--------|-----------|------------|------------|--------------|--------------|
| 144 | 1 | 0.1111 | 0.00367309 | 0.00009127 | 0.000022057 |
| 9 | 1 | 0.0330579 | 0.00084176 | 0.0000206612 | 0.0000051351 |
| 272.25 | 272.25 | 1 | 0.025 | 0.00625 | 0.00015625 |
| 10896 | 1210 | 40 | 1 | 0.25 | 0.00625 |
| 43560 | 1840 | 100 | 4 | 1 | 0.0625 |

Very large surfaces, as of countries, are expressed in square miles.

The measures of SOLIDS are cubic yards, feet and inches, of which 1,728 cubic inches are equal to one cubic foot, and 27 cubic feet to one cubic yard; 42 cubic feet are a ton of shipping.

IMPERIAL LIQUID AND DRY MEASURE.

| Pints. | Quarts. | Gall ns. | Pecks. | Bushels. | Quart. rs. |
|--------|---------|----------|--------|----------|------------|
| 1 | 0.5 | 0.125 | 0.0625 | 0.015625 | 0.00390625 |
| 2 | 1 | 0.25 | 0.125 | 0.03125 | 0.0078125 |
| 4 | 2 | 0.5 | 0.25 | 0.0625 | 0.015625 |
| 8 | 4 | 1 | 0.5 | 0.125 | 0.03125 |
| 16 | 8 | 2 | 1 | 0.25 | 0.0625 |
| 32 | 16 | 4 | 2 | 0.5 | 0.125 |
| 64 | 32 | 8 | 4 | 1 | 0.25 |
| 128 | 64 | 16 | 8 | 2 | 0.5 |

A cubic metre is equal in volume to 35.3174 cubic feet English, or to 220.067 imperial gallons. It is nearly equivalent to the old English tun of four hogsheds, holding 35.248 cubic feet. It has been for some time in use on the continent for measuring sewage and water supply; and is now employed for the same purpose in England.

By the Act of 1824, 5th Geo. IV, c. 74, the standard measure for all liquids, corn and other dry goods, was the *Imperial gallon*, which contains ten pounds avoirdupois of distilled water, weighed in air at the temperature of 62 deg. Fahrenheit, the barometer being at 30 inches. The pound avoirdupois contains 7,000 troy grains, and a cubic inch of distilled water (temperature 62 deg. Fahr., barometer 30 inches), weighs 252.458 grains. Hence the imperial gallon contains 277.274 cubic inches. The old gallon, of wine equalled 231 cubic inches, of corn equalled 268.8 cubic inches, of ale equalled 282 cubic inches.

The Standard of Weights and Measures in the Exchequer, Anno 12 Hen. VII, on a large folio sheet engraved by Vertue.

SCALE, *Tables for valuing Estates in Ireland from 1s. to 25 per acre, and the reduction of Irish Plantation Measure into English Statute Measure, and vice versa*, 8vo., Lond., 1771.

HOOPER (George, Bishop of Bath), *Inquiry into the State of the Ancient Measures, the Attick, the Roman, and especially the Jewish*. (Anon.) 8vo., London, 1721.

ARBUTHNOT, *Tables of Ancient Coins, Weights, and Measures*, 4to., Lond., 1727.

EYTELWEIN, *Measures and Weights*, Berlin, 1810.

BUCHAN, *Comparison of English Weights and Measures to those of France*, 8vo., Paris, 1817.

JOMARD, *Exposition du Système Métrique des Anciens Egyptiens et sur les mesures des autres peuples de l'Antiquité*, in *DESCRIPTION DE L'EGYPTE*, 8vo., Paris, 1822, vol. vii.

KELLY, *The Universal Combist*, 4to., London, 1835.

WOOLHOUSE, *Tables of Continental Lineal and Square Measures*, at end of *MOLLER, Memorials*, transl. by LEEDS, 8vo., Lond., 1836.

CARRINGTON, *Foreign Measures and their English equivalents*, 8vo., London, 1841.

KUPFFER, *Travaux de la Commission pour fixer les Mesures et les Poids de l'Empire de Russie, rédigés par*, 4to., S. Petersburg, 1841. This work gives an independent investigation of the standards of other countries, and a comparison of Foreign weights and measures with those of Russia.

WATERSTON, *Manual of Commerce, Measures of all Countries*, 8vo., Edinb., 1840; and his *Cyclopædia*, 8vo., Edinb., 1847.

ALEXANDER, *Univ. Diet. of Weights and Measures reduced to British Standards*, 8vo., Baltimore, 1850.

MICHELSSEN, *Synopsis of Foreign Money, Weights, and Measures, reduced to the English Standard and equivalents*, fol., Lond., 1853.

WOOLHOUSE, *Measures, Weights, and Money of all Nations, etc.*, in *WEALE'S Rudimentary Series*, vol. 101st, 12mo., Lond., 1856.

WILLIAMS (G.), *Complete Collection of all the useful Weights and Measures*, 8vo., London, 1853.

PRINSEP, *Essays on Indian Antig. Tables of History, Coins, Weights, Measures, etc.*, notes by Thomas, 2 vols., 8vo., 1858.

DOWLING, *Tables for comparing British with Metric Measures and Weights at present in use on the Continent*, 8vo., 1864.

BROWNE, *The Merchant's Handbook*, the money, weights, and measures of each country, and their English equivalents, 12mo., London, 1867.

CLARKE (A. R.), *Comparisons of the Standards of Length of England, France, Belgium, Prussia, Russia, India, Australia, made at the Ordnance Office*, Southampton, 10 pl., 4to., 1866.

CRESY, *Encyclopædia*, 8vo., London, 1896, pp. 911-3, from Folkes, Raper, Shuckburgh, Vega, Hutton, Ozama, Cavallo, Young, etc.

GWILT, *Encyclopædia of Architecture*, 8vo., Lond., edit. by PAPWORTH, 1867, articles Foot and Measure, in Glossary.

SMITH, *Dictionary of Antiquities*, 8vo., London, 1851.

MURRAY's *Handbook for each country*; and in some cities and places.

HORE, *Explanation of Ancient Terms and Measures of Land*, etc., 1874.

The complexity of the present weights and measures in use in Great Britain is described in *BUILDER Journal*, xxi, 77.

In the "Conservatoire des Arts et Metiers" at Paris, a large and interesting collection of standards of length and capacity, is publicly exhibited. A similar collection is being formed in London by The Standard's department of the Board of Trade, the old Jewel Tower at Westminster having been fitted up for containing it.

In France the standard of lineal measure is now the *mètre*, to which reference can be made; that of superficial measure is the *are*, or a surface of ten metres each way; that of capacity, the *litre*, a cube containing the tenth part of a metre; that of solidity is the *stère*. (*MÈTRE*.) Thus the

| | |
|-------------------------------|------------------------|
| Mètre is reckoned as equal to | English feet. |
| Are is reckoned as equal to | 119.6033 sq. yards |
| Litre is reckoned as equal to | 0.22009608 imp. galls. |
| Stère is reckoned as equal to | 35.31658 cubic ft. |

TARBE, *Manuel complet des Poids et Mesures et de la vérification*, Paris, 1845.

BARNY, *Traité historique des Poids et Mesures et de la vérification*, Paris, 1863.

YATES, *On the French system of Measures, Weights, and Coins, and its adaptation to general use*, London, 1854.

THE STANDARD'S COMMISSION, *Second Report*, fol., 1869.

Amongst the instances of standards of length put up by authority in public situations, may be mentioned the *Braccio* on a wall near the gate of the palazzo del Bargello at Florence; also against the wall of the Campidoglio at Rome; the *Mètre* on two or three places on walls at Paris; a *yard*, 2 *feet*, 1 *foot*, 6 *ins.* and 3 *ins.*, in the wall near the entrance to Greenwich Observatory, London.

Five Greek liquid measures were discovered at Gythion, as related in *BUILDING NEWS Journal*, Dec. 1869, p. 489.

MEASURE AND VALUE. The mode adopted by architects and surveyors to ascertain the sum to be paid for works executed by a builder when no price has been previously agreed upon. Theoretically, "measure and value" is the most equitable and accurate method of ascertaining the amount due from an employer to a builder or workman for work executed—where the result can be measured—the exact quantity of work performed being charged, and the due value or price being affixed to each item in the bill of the work measured. But in practice, however advantageous this system may be to the tradesman, it has been found open to serious objection on the part of the employer; thus, until the accounts have been finally made up, the total amount of expenditure cannot be ascertained with certainty, or in some cases even approximately; and however exactly the measurements may have been taken,

the difficulty of ascertaining the precise value of each item in the bill resulting therefrom, is so great that the ultimate gain to the tradesman by the accumulation of even a very trifling advantage on the price of each item may be often very considerable; and however skilful the surveyor or valuer may be, this will generally be the case; while an unskilful or negligent valuer may add very greatly indeed to the builder's profits, more especially by allowing for work of inferior material and workmanship, prices which would be only equitable for work of similar verbal description, but of the best class; or the same price for machine produced work as would be justly allowed for hand work; while, on the other hand, he may, by overlooking important elements of prime cost and even minor details, produce a result adverse to the tradesman. Thus the present system of contracts on a lump sum finds more favour from employers who think they thus obtain an approximation to certainty of ultimate cost, and undoubtedly gain the benefit of competition between builders and of their skill in conducting their business and in taking advantage of the markets.

QUANTITIES.

Where the extent of the work to be executed cannot be, or is not clearly, determined, or time does not permit of the completion of the preliminaries necessary to a contract in gross for a lump sum, such as complete working drawings and specification, detailed Bills of Quantities, etc., it has been found advantageous to combine both systems, by preparing a full detailed schedule of items of work likely to be required, and offering the prices only to be tendered for; the comparative result being obtained by the moneying out of an imaginary bill of quantities approximating to the relative proportions of each item likely to be required. The work is then measured when executed, in accordance with the principles set out in the schedule, and the prices affixed to each item are those of the accepted tender, or are calculated on a similar basis and in harmony therewith. Thus the employer pays only for the work done at prices obtained by competitive tender, and the contractor is paid for all the work he does at prices fixed by himself; perhaps no more equitable or accurate system can be adopted. The practice which obtains in Glasgow is somewhat similar; a contract in gross is made on detailed bills of quantities approximating to the probable actual result, and, when the work is finished, the whole is measured as executed, and valued in accordance with the prices of the tender.

"Measure and value" has been brought into much discredit from having been adopted amongst tradesmen to ascertain the respective values of work done for each other on speculative buildings, a class of work termed "blood work"; the value being charged as by *custom*, and not with reference to the manner in which the work was executed, whether good, bad, or indifferent, and each tradesman endeavouring to take advantage of the other to the utmost of his ability. A. C.

A writer in *LODON*, *Arch. Mag.*, 8vo., Lond., 1834, i, 12-6, at that time drew attention to the subject in a forcible manner. The proper preparation of work, as for painting, for instance, forms an important item in the calculation of prices; and this in execution, in many instances, is not attended to at all. Surveyors, if they were valuers, ought to be able to price the works submitted to them according to the actual manner in which the works are executed, considering all the special circumstances of each case, the actual cost (if it can be arrived at) and the skill exhibited; such a system, when well established, would soon gain the confidence of the public and induce an equitable mode of dealing; *BUILDER Journal*, 1846, iv, 97.

MEASUREMENT. The quantity of the work as measured. The size of the work or portions of the work. For various methods of entering in the note book the measurement or dimension taken, see **NOTATION**.

MEASURE OF LIME is equal to a single load or a cubic yard; *BURNELL, Price Book*, 1865, p. 277. The load is

ARCH. PUB. SOC.

described *s. v.* Bushel, and *s. v.* Load, as containing 21 struck imperial, or 17 heaped (called 18) bushels. **LOAD**.

MEASURER (Lat. *ensor*; Fr. *mètreur*; Sp. *medidor*). One who takes measures or dimensions of buildings and lands. Sufficient evidence exists to show that a measurer or measuring clerk was formerly one of the architect's staff, who was paid a moderate salary; and that the architect charged, or did not charge, according to circumstances, his client for measuring, either the building itself, the extras, or the omissions—probably sometimes the builder was charged half the amount for measuring the two latter items, if not employing a clerk in his interests. Measuring as an independent system arose about 1800; the difference of action in one establishment may be seen in the first, second, and fourth *Reports of Commission of Military Enquiry*, especially iv, 145, 235, and 301; and in *NOBLE, Prof. Practice*, 8vo., London, 1836, pp. 13-36. Since then, a distinct class of measurers, or measuring surveyors, or quantity surveyors, have established themselves, especially since the general adoption of the contract system, and the use of quantities in competition contracts; the client for whom the work is done paying for this work, he being supposed to obtain the benefit of a more accurate calculation than would be made by a builder, of the details of the work to be executed. **MENSOR. MENSURATOR.**

The system of lump sum contracts for a definite amount has created a class of "quantity surveyors". The charges of the surveyor for taking out the quantities, and the expenses incurred in printing or lithographing them, and distributing them to the competing builders, are added as distinct items to the summary or total of the builder's work, and are included in the tender and the contract amount. The surveyor is paid by the builder out of the first instalment he receives on account of his contract. If the building tendered for is not proceeded with, and the quantities have been taken out by a surveyor appointed by or with the concurrence or cognizance of the client or his architect, such surveyor looks for his remuneration to the client for whose benefit the quantities were taken out; it being held that the providing of quantities being a necessary preliminary to the obtaining of tenders, the architect has by custom authority to employ the surveyor on behalf of the client, although the latter may not have directly authorised such employment. Thus in *Moon v. the Guardians of the Witney Union*, 3 Bing., N. C. 814, the court held that the architect as agent for the defendants had authority to bind them in a contract with a surveyor (the plaintiff) to take out the quantities for their intended buildings; *JENKINS and RAYMOND, On Building Contracts*, 12mo., London, 1873, pp. 26-31.

In cases where the surveyor is employed solely by the builder, without the concurrence of the architect or the client, it is usual for him to arrange with his employer for his payment in case of the work not being carried out, or the tender based on his quantities not being accepted. **QUANTITIES.**

In Edinburgh the surveyor is a sworn measurer, taking an oath to measure justly and truly. The duties of the measurer require care, patience, and skill; an accurate knowledge of the mathematical principles of mensuration, and special acquaintance with the details and manipulation of the various branches of the building trade. A. C.

MEASURING. The process of taking the dimensions of work to be done, or of work done. The practice is dependent on the rules of mensuration, which are described in works on arithmetic, etc.; the application of them to building to obtain the above result, and to ascertain their probable or actual cost, is the labour of the surveyor or measurer, and is detailed in works on the subject. Among these are *GWILT, Encyc.*, 8vo., London, 1867, p. 730. *PASLEY, Outline of a Course of Practical Arch.*, 4to., Chatham, 1826, pp. 333, 345-55. *DOBSON, Student's Guide to Meas. and Val. of Artificer's Works*, 8vo., London, 1843; new edit. by *GARBETT*, 8vo., 1852-53. *PEDDIE, Practical Meas. Tables, etc.*, 1843.

BENNET, *Lexicon of Terms and Prices, and Labour Prices, etc.*, 8vo., 1837. REID, *Surveyor and Builder's Assistant; or Practical Manual of Mensuration, etc.*, 4to., London, 1848. J. R. YOUNG, *Introductory Treatise on Mensuration*, 1853. HEBB, *On taking out Quantities and Measuring Works*, in ROYAL INST. OF BRIT. ARCHITECTS, General conference of architects, *Proceedings*, 4to., 1871.

Measuring after the completion of the works was in vogue in Edinburgh in 1754, as noticed at the end of a contract given in SCOT'S MAGAZINE, xvi, 454. *Measurements and Tenders*,—the system pursued in Glasgow, is detailed in *BUILDER JOURNAL*, 1862, xx, 82, whereby the work is contracted for according to a schedule of approximate quantities; "when the building is completed, the work is measured and valued in terms of the original provisions, when the detailed measurement is generally twice as large a document as the original schedule"; SHIELDS, *Sketch of the History and Present Practice of Measuring Artificer's Work in Glasgow, with statement and comparison of different modes of Estimating*, as given in same *Journal*, xx, pp. 780-3.

The practice of claiming by the profession remuneration for measuring work distinct from the ordinary commission of 5 per cent., appears to have originated about 1790. It is certain, that it was not customary long before that period, but such remuneration is known to have been claimed and received in 1794. Sir John SOANE, *Letter to Earl Spencer*, 8vo., London, 1799, p. 5, states that Holland (as a witness) deposed that "he was in the habit of charging one, two, and two and a half, per cent. in addition to the usual allowance of five per cent.," for measuring up works, a claim which was combated by Soane; and the verdict was given against it as made by —Stodart.

A *Report of the Committee of Professional Practice* appointed by the Council of the Royal Institute of British Architects, to consider as to the remuneration paid by the Commissioners of Works and Public Buildings to the Architects employed by them, and presented July 1867, contains rough memoranda extracted from the *Reports on the Board of Works*, 1813-28, in which are many notices of the remuneration due to architects for measuring works. One remarkable passage is quoted from these reports: "It is admitted by all the architects whom we have consulted, that the settlement of the tradesmen's bills and rendering complete accounts to the employer, forms part of the duty of the architect or surveyor, to whom the commission of five per cent. on money expended is allowed." Yet Sir J. Wyattville, in 1826, stated that he had "never paid for measuring out of my commissions in the various magnificent concerns that have been intrusted to my care, nor can I learn that any one in a superior rank of the profession has done so; at the same time it is not unlikely, nor improper, that a young man beginning business, or one who has employment for himself, or perhaps one clerk only, may engage in the measuring of works done under his direction, but it is much to be doubted whether or not it is advantageous to the employer." NOBLE, *Prof. Practice*, 8vo., Lond., 1836, pp. 33-8, comments on the information contained in these *Reports*. In the *Report* of the Committee, they observe that "within the last half century, in consequence of the improvements in many practical points of professional duties originating with the late Sir Robert Smirke, the measuring and bill department has been transferred virtually and generally to the class of measuring surveyors, and is distinctly carried on by them. From their large practice and special attention to this department, they are peculiarly qualified to protect the interests as well of the employer as of the employed." During the remarks made at the deputation which followed on the above *Report*, "the deputation, in reply, gave it as their unanimous opinion, in confirmation of that expressed by the president, that the system of measurement and a schedule of prices only led to disputes, and in many cases to frauds, and that the best and most economical course for the Government was by contract in the gross."

The Parliamentary Reports, No. 491, Session 1819; No. 117, and 405, Session 1856; and in 1857, refer to Sir C. Barry's claim for remuneration for services at the new palace of Westminster; his protest against the decision is printed in the notice papers of the Royal Inst. of Brit. Architects, 27 April, 1857.

While the examining and certifying the contractor's accounts are part of the duty of the architect, covered by the five per cent. commission, the ordinary practice as regards the detailed measurements and valuation of the variations on the contract, whether of extras and omissions, or of additional works, is for the bills to be prepared by a measuring surveyor, or jointly by two—one acting on behalf of the client, and the other for the builder—this being best entrusted to the surveyor by whom the quantities for the contract may have been taken out; the charges for the measurement and valuation are added to the total of the bill of extras or additions, and deducted from that of the omissions—in like manner as they may have been dealt with in the original estimate. *Scale of Charges* as published by the Royal Institute of British Architects.

A. C. Before the general introduction of "quantities", the "measuring dinners" were a general and abused practice; *First and Second Reports of Commission of Military Enquiry*, p. 315; and entertainments for clerks, etc., on measuring up works, is referred to in C. CLARKE, *Plasterer's Bill, etc.*, 8vo., Lond., 1783, p. 18; and in NOBLE, *Prof. Practice*, 8vo., London, 1836, p. 15.

MEASURING. The act of taking the dimensions of a building and of its parts, so as to be drawn out on paper to any chosen scale, and give a complete representation of the structure or of the portions desired. This operation should be done with great care and accuracy; but it is doubtful whether in ancient and in dilapidated instances, their condition can be such as to warrant the use of very minute parts of an inch or decimals of it in the admeasurements. The stones should also be measured, and the joints carefully noted, especially in the ornamental work, for the purpose of recording examples of the construction of such parts. This is not less important in Classical than in Mediæval work, as much of the character of the design depends on the dimension and nature of the stone available; and the contrivance by which large results have been obtained by small means, are worthy of careful study. NOTATION. LAND MEASURING is already noticed, *s.v.* ENGLEFIELD AND WINDHAM, *Report on Measuring and Drawing Ancient Buildings*. GUARINI, *Modo di misurare le fabbriche*, 8vo., Turin, 1674.

It is curious, that the decimal system of measuring should have been suggested so far back as the latter part of the seventeenth century, when it was recommended that as "There are several sorts of superficial measures, as paving, plastering, wainscoting, and painting; which are to be measured by the yard square—your readiest way is by the yard divided into ten parts—or if you measure by the foot rule have it divided into ten parts"; M. COOK, *Forest Trees*, p. 215, 8vo., London, 1675; 1717; 1724. A paper by PENROSE, *Few words in favour of the decimal, but against the metrical, system of measurement, etc.*, read at Royal Institute of British Architects, *Sessional Papers*, 30 Nov., 1863; and 1 Feb., 1864.

MEASURING IMPLEMENTS. These consist of a two-foot rule (FOOT), a YARD measure, a five-foot rod, a pair of five-foot rods, a ten-foot ROD, and a tape of 50 or 100 ft. in length, or of 66 feet, being then equal to a CHAIN in length. In measuring land, a chain of 66 feet, and of 100 feet in length is used, besides the above. A LINE was formerly employed in measuring. A STRING is used to take the girth of mouldings, and of timber. For the subject of measuring timber, see TIMBER.

MEAT MARKET. The few remarks on the ancient Roman *macellum*, or meat market, given in the first part of the article ABATTOIR, *Detached Essay*, need not be repeated here; the subject of a market for the sale of meat, the result of the killing of animals for food, beyond what is stated *s. v.* MARKET,

may be usefully comprised in the general description of the two most modern edifices of the sort in England, namely those at London and Manchester.

Smithfield, the site of the "Metropolitan Meat and Poultry Market", was used from about 1150 until 1855 for the sale of cattle; in the latter year, a new cattle market was opened in Copenhagen Fields; and in 1860, powers were obtained by the corporation of the City of London to erect the present building. The carrying out of the work was confided to the Markets Improvement Committee, who purchased the property required at a cost of about £235,000; a design was prepared by Horace Jones, the city architect; and a contract entered into on 22 Dec., 1866, for the erection of the building; the first portion was commenced on 1st May, 1867; and the whole inaugurated 24 Nov., 1868; and opened for business on 1st Dec. following. The Railway Companies excavated the site, and formed the substructure in which about $3\frac{1}{2}$ millions of cubic feet of earth had to be removed. Twenty-one main girders were carried across the entire width—240 feet—on wrought iron stanchions. On these girders were laid cross girders, 2 ft. 6 in. deep, and 7 ft. 6 in. apart, between which were turned brick arches, the whole being covered with concrete and asphalt to receive the wood pavement of the market.

The market covers a space of ground 625 ft. long, and 247 ft. wide, the external walls being generally about 32 ft. high; these are built of a series of arcaded recesses of red brickwork, between Doric pilasters on pedestals of Portland stone; the head of the recess is filled in with iron scrollwork, so designed as to occupy the space, and yet leave room for air and light to pass freely through; and under it are ornamented windows also filled in with iron-work. Four towers mark the angles, which are occupied as taverns, etc.; archways mark the public roadway, which passes through the market from north to south; and pedimented gateways on the east and west fronts, form the entrances to the central avenue through the length of it. This roadway is 50 ft. in width, covered by elliptical iron arches carrying the roof; it is separated from the market by an elaborate screen of open iron-work 14 ft. high, having gates where the central avenue intersects; this avenue is at the entrances 19 ft. wide and 27 ft. high, each pair of the gates at these two entrances weigh 15 tons, and are 19 ft. by 25 ft., perhaps the largest in the world.

One of the leading features of the arrangement of the market is that for securing light without sunshine, and free ventilation without exposure to rain or snow. This has been accomplished by using the Mansard form of roof throughout the building; the lower part is filled in with broad glass louvres, which admit air, whilst the overlapping of the plate glass shuts out the direct rays of the sun; thus rendering the inside in summer about 10 deg. cooler than in the shade outside. The shops are arranged on each side of the side avenues or passages, of which there are six, each 18 ft. wide, which cross the building from north to south, and intersect the central avenue 27 ft. wide. The cast iron framework forming the shops, composed of light iron columns and lattice girders 18 in. deep, and to which the brackets for carrying the rails and meat-hooks are fixed, form a large item in the cost of the structure. There are 162 shops, each about 36 ft. by 15 ft.; each consists of a front shop enclosed by open iron railing, and a back shop, which can be entirely closed after business hours; in it is the counting house, and over it a private room with w.c., etc. The entire cost of the market was under the estimate of £200,000. A corner turret, and an elevation of an exterior compartment, is given in the *ARCHITECT Journal*, 4to., London, 1869, pp. 43 and 102.

The "Western extension", commenced in May 1873, which will be opened early in 1875, from the designs of the same architect, will be devoted to poultry and game. Its treatment is similar in its general features to the existing market. The chief points in the external design are the four pedimented pavilions at the corners, the centre or clock towers on the north or south

fronts, and the east and west entrance gateways. A light effect will be gained by means of semicircular ribs to the avenue roof. Abundant light will be diffused throughout, from the roofs constructed on the glazed Mansard principle, already found effective both for lighting and ventilating.

This extension covers an area 263 ft. long by 247 ft. wide, with a height of 28 ft. to the plate, and of 41 ft. to the ridge, of the roof. The eight avenues are each 21 ft. 6 ins. wide between the centres of the columns, and 16 ft. in clear width between the stall boards of the shops; four avenues run north and south, and four others east and west, dividing the interior into blocks, each containing four shops, of which there will be seventy-two, exclusive of the corner pavilions; the area of each will range from 380 to 700 ft. Each will possess commodious cellars, besides a long series of vaulted and groined brick cellars averaging 12 ft. in height, which can be entered from any of the pavilions. The probable cost will be about £100,000.

H. J.

The new abattoir and carcase market at Manchester, have been erected on a plot of land situate in Water Street, and having the river Medlock on one side. The site occupied by the various blocks of buildings and roadways is between two and three acres in extent; the frontage along Water Street is 533 ft., the greatest depth to the river being 321 ft. 6 ins. The works were designed by Alfred Darbyshire of Manchester. The foundations were commenced 23 Sept., 1870, the first stone was laid by the mayor 8 June, 1871, and the establishment was opened 19 Dec., 1872; the total cost was £25,527 9s. 9d., exclusive of architect's commission and clerk of the works; and also of sundry works, as the corporation paved the roads, built the river wall, etc. The style is a modern adaptation of the principles of Gothic architecture.

In projecting this scheme, a new and original problem was presented for solution, namely the association of a carcase or dead meat market with the buildings to be used for slaughtering cattle. This idea had not before been worked out in this country. In arranging the plan, the architect sought to work in direct communication with the market as many abattoirs or slaughter-houses as possible; and with this object, the market has been placed along the whole length of the Water Street frontage, with the exception of the portion occupied by the lodges and entrance gates. By this arrangement, twenty-one slaughter-houses, with lairs for cattle attached, are placed in the rear of the market, with a roadway between for ventilation. These houses are used by the wholesale carcase-butchers whose meat will be sold in the market; each carcase-butcher will possess a lair, a slaughter-house, and a bay in the market. The rest of the site is occupied by the retail butchers, who will each possess a lair and a slaughter-house only, their meat being taken away, when dressed, to their own shops and shambles for sale. There are nineteen retail houses with lairs. Behind these blocks are arranged the pig slaughtering department, the blood house (where the albumen will be extracted), and the condemned meat department, consisting of a lair, a slaughter-house, and a boiling house. On each side of the entrance archway are the residences for the inspector and custodian, also a committee room with office, etc., attached. An assembly or common room is also provided for drovers and others employed in the establishment; and there is also a large general lair for occasional use.

The carcase market is 418 ft. in length by 53½ ft. wide inside, covering an area of 2,577 sq. yards. It is roofed in one span by a framed truss composed of wrought and cast iron, ventilated by two rows of louvre ventilators, and lighted by skylights running the whole length of the building. Four entrances from Water Street admit the carts of purchasers by a roadway running up the centre; this roadway and the whole of the floor of the market have been laid with asphalt on a brick foundation. The interior of the market is faced with red brickwork, with an

ornamental brick cornice; the lower portion of the walls have a dado of white glazed enamelled bricks for cleanliness. The slaughter-houses are capacious and lofty, and lighted by skylights; the lower portions of the wall from the floor are lined with enamelled bricks, so that all blood-stains can be removed by means of a hose-pipe attached to a water-cock inside the house. The system of drainage is somewhat novel. There are no openings from the slaughter-houses, but the floors are laid with flags in such a way that any liquid escaping from the slaughtering is swilled out at the door opening to the roadway, into a stone channel running the whole length of the frontage. This channel, at certain distances, is supplied with an iron grid opening into a movable basket or box, which retains any portion of solid matter that may by chance find its way from the slaughter-house. Beneath these boxes is an efficient trap, and the boxes are emptied at stated periods by the town scavengers. The lairs, however, have openings direct into the drains.

The peculiar principle of planning before alluded to—namely, the working of slaughtering directly with the markets, involved a problem by no means easy of solution, it being the object of the architect to economise time and labour, and, if possible, to obtain the minimum of these two important items. The details of this portion were entrusted to Mr. John Meiklejohn, of the Westfield Iron Works, Dalkeith; who has patented the invention. The many advantages, which his system presents, both in a sanitary and an economical point of view, may be briefly stated as follows: 1. The simplicity of the action of the hoist, the absence of complicated machinery, and the ease with which a man can lift the heaviest carcases. 2. One hoist performs the whole operation, consisting of hoisting, dividing, hanging, and loading. 3. The apparatus is all overhead, leaving the whole floor room below free from obstruction. 4. The butcher is able to hoist, divide, hang in market, pick off again and load, without disturbing or moving any other carcase. And, lastly, the butcher is enabled to effect all this without handling the carcase or carrying it on men's shoulders, a process not calculated to improve the condition of this kind of human food. Further details will be found in ROYAL INST. OF BRITISH ARCHITECTS, *Sessional Papers*, 1874-75. A. D.

The *boucherie* or *halle à la viande*, at Ypres, of the fourteenth century, is given in GAILHABAUD, *L'Arch. du Vme, etc.*, 4to., Paris, 1858, iii, 2 pl. The meat markets at Gand had chapels attached to them; the business of butcher in the time of Charles V (1519-56) was confined to the four great families of Vanmelle, Vanloo, Meime, and Deynoodt; the grande boucherie dates 1408. NARJOUX, *Arch. Communale*, fol., Paris, 1870, gives the *halles et marche* at Vernon (Eure) by Delbrouck, and another at Scherzigen in Switzerland. BALTARD and CALLET, *Les Halles Centrales de Paris*, fol., Paris, 1864. MARKET.

MEAUX. (The Roman *Iatinum*, the Latin *Meldi* or *Civitas Meldorum*.) A town in France, situated north-eastward of Paris. The town is divided by the river Marne, over which is a timber bridge, replacing the stone one destroyed in 1814; and the canal of the Ourcq passes by the ancient walls. It is the see of a bishopric, established in the fourth century. The principal building is the cathedral, dedicated to S. Etienne; the six lower arcades of the choir date in the twelfth century; portions of the nave (which is vaulted, and 109 ft. high) adjoining the transept are ogivale primaire; parts of the transept and the side portals are ogivale secondaire; and the principal portal and some accessories are of a later period. Its restoration was completed before 1852. GAILHABAUD, *L'Arch. du Vme, etc., siècle*, 4to. and fol., Paris, 1858, gives, 1, the interior elevation of the north transept in 4 pl. ALLOU, *Notice sur la Cath. de M. PLESSIS, Hist. de l'église de M.*, 1730. There are three other churches of which S. Nicholas had been restored prior to 1852; the palais de justice built by the ancient counts of Champagne, good barracks for cavalry, a bishop's palace having a library, a magnificent

general hospital, a public library of over 14,000 volumes, and other public buildings. A house behind the cathedral is a good specimen of the fifteenth century; it is of stone, and flanked by turrets.

A great part of the chateau de Fresne near the town, was designed by F. Mansart for Guénégaud, the secretary of state, the chapel being a reduced copy of his design for the church of the Val-de-Grâce; a plan and three sections of the chapel were engraved by Mariette. 14. 28. 63.

MECCA or MEKKA. The most celebrated city of Arabia, being the birthplace of Mahomet, who was born there A.D. 571. In the centre of the town, dividing it into the northern and the southern portions, is the great mosque Beilu-'llah or Beilhou 'llah (house of God), or El-Haram (the inviolable)—enclosing the *kaaba* (holy of holies), or sacred house. This mosque, is an unsymmetrical, modern looking, patchwork of ancient fragments, without any pretension to unity or style. (JACQUIN.) It has 19 portals and 7 minarets, of various epochs and heights, and neither very large nor beautiful. Within, the great court has on each side a broad colonnade of irregular pillars, each divided into three or more ailes: it is 380 ft. long by 570 ft. wide, and about 30 ft. high; surmounting each arch of the colonnade is a small dome, of which there are about a hundred and twenty in all. Nearly in the middle is the *kaaba*, about 40 ft. long, 32 ft. wide, and not exceeding 40 ft. in height; it is of stone, and was erected in 1627. The sides of it are completely covered by the *keswa*, a veil or curtain of rich black silk; and at the distance of several yards, it is surrounded by a balustrade provided with lamps; this enclosed space is the circuit ground trodden by the pilgrims. Besides the *minbar* or pulpit, and the desks assigned to the doctors, there are round the *kaaba* eight minor structures including a triangular staircase, irregular and unsightly buildings, not requiring detailed notice.

A plan of the town is given in PRISE D'AVENNES, *Miroir de l'Orient*, 4to., Paris, 1852, which shows the length of the mosque to be N.E. to S.W. RELANDI, *De religione Moham.*, 12mo., 1717, gives a plan of the mosque, which is probably superseded by one taken by Ali Bey, and given in FERGUSON, *History of Arch.*, 8vo., Lond., 1867, ii, 392. OCKLEY, *Hist. of the Saracens*, 8vo., Lond., 1848, 5th edit., 3, 427, 457, 476, 480. WELLSTED, *City of the Caliph*, 8vo., Lond., 1840, i, 362. BURTON, *El Medinah and Mecca*, 8vo., Lond., 1855, 1857; LANE, *Arabian Nights*, 8vo., Lond., 1859.

MECHANICAL DRAWING. The art of drawing by instruments, in contradistinction to free-hand drawing, or landscape, ornament, figure, etc., drawing.

MECHANICAL ENGINEERING. This, another branch of civil engineering, is exclusively confined to the designing and manufacture of machines for producing motion, or for performing certain simple operations in the ordinary departments of industry, such as: Steam engines for the purpose of driving machinery, for raising loads, pumping water, locomotives, steamboats, grinding mills, etc.; the various spinning, weaving, tool making, sawing, planing, grooving, polishing, rolling, blowing, drawing, brick and tile making, threshing, and other machines; these constitute the objects of the labours of the mechanical engineers—the *ingénieurs mécaniciens* of the French. There is little room for the display of taste in this branch of the arts; but CLEGG, *The Architecture of Machinery*, 4to., London, 1842, proves that there is even a practical reason for the study of at least the elementary principles of aesthetics by the mechanical engineer. CAMPIN, *Practical Treatise on Mechanical Engineering*, comprising metallurgy, moulding, casting, forging, tools, workshop machinery, mechanical manipulation, manufacture of steam engine, etc., with Appendix on the analysis of iron and iron ores; 8vo., London, 1863. D. K. CLARKE, *Railway Machinery, Treatise on Mechanical Engineering*, fol., London, 1855, 70 pl. *Proceedings of the Institution of Mechanical Engineers* (Birmingham), 8vo., 1849, et seq. *G. R. B.

MECHANICAL POWER. The name given to a certain machine or engine, occasionally used by itself in moving a body or heavy weight, or combined with another in the formation of the complex constructions which are employed in manufactures and the arts. These several machines are the lever, the wheel and axle, the inclined plane, the wedge, the screw, and the funicular machine. For the applications of these mechanical powers, the reader is referred to publications in which machines or engines are expressly described; as GREGORY, *Mechanics*, ii; and BARLOW, *Treatise on Manufactures*, in the ENCYC. METROP.

MECHANICS. This term is defined by Dr. WALLIS to be "the geometry of motion". The science of the laws of motion and equilibrium, and the application of these laws to the construction and use of machines. The following are among the works on this subject useful to the student: FENWICK, *Mechanics of Construction*, including the theories of the strength of materials, roofs, arches, and suspension bridges; 8vo., Lond., 1861. TATE, *Exercises on Mechanics and Natural Philosophy*, 8vo., 2nd edit., London, 1847. RANKINE, *Harmony of Theory and Practice in Mechanics*, 8vo., Glasgow, 1856. TARN, *The Science of Building*, Elementary treatise on the principles of construction, adapted to the requirements of architectural students, 8vo., London, 1870. BURN, *Handbook of the Mechanical Arts* concerned in the construction and arrangement of dwellings, etc.; also well-sinking, enclosing of land, road-making, etc.; 8vo., Edinb., 1860. MOSELEY, *Mechanics applied to the Arts*, 8vo., 1839; and his *Mechanical Principles*, 8vo., 1843; LEARMONT, *Practical Mechanic's Assistant*, 1857; HASLETT and HACKLEY, *Practical Book of Reference*, 8vo.; and MOLESWORTH, *Pocket Book of Formulae, etc.*, 1864. RANKINE, *Applied Mechanics*, 8vo., Lond., 1868.

POISSON, *Traité de Mécanique*, 8vo., Paris, 1811; LAGRANGE, *Mécanique Analytique*, 1811-15; BOGNIIS, *Traité complet de Mécanique appliquée aux Arts*, 4to., Paris, 1818-23; BELLANGER, *Cours de Mécanique*; LAURENT, *Traité de Mécanique rationnelle*, 1871; PHILLIPS, *Cours de Mécanique appliquée*; NAVIER, *Leçons sur l'application de la Mécanique*; MORIN, *Aide Mémoire*, etc., 8vo., 1847; and *Fundamental Ideas of Mech. and Experimental data*, 8vo., 1860.

MECHELEN (Fr. *Malines*; Eng. *Mechlin*). One of the most ancient and picturesque cities in Belgium. It is of a circular form, situated on both sides of the river Dyle, and had eight gates, of which one only, of the fourteenth or fifteenth century, now remains. Amongst the examples of domestic art, the elevation of a stone house, dated 1536, on the bank of the canal, is given in *Builder Journal*, 1846, iv, p. 450. The principal edifice is the cathedral, dedicated to S. Rumold or Rumbold. The four reeded columns at the intersection of the nave and transepts are part of the church commenced towards the end of the twelfth century, finished 1312, and burnt 1841; the choir was completed 1366, the apse 1451, the vaulting of the nave 1487. The choir has been lately fenced to the west by a high wooden screen of bad design, and the tower space destroyed by an organ gallery. The exterior was in course of reparation from about 1840. The high altar of marble, dating 1660, has above it a modern shrine of wood, containing the relics of the saint. The carved pulpit 1631 represents the conversion of S. Paul. There are tombs to the princes of the Berthold family, one of which, near the left entrance to the choir, is by L. Fayd'herbe. The massive tower, 92 ft. wide at the base, was commenced 1452, perhaps by A. Keldermans, or by Walter Coulman or Coolman, as stated in INST. OF CIVIL ENGINEERS, *Proceedings*, 8vo., Lond., 1851, x, 242-3, which gives details of its construction and condition in 1837; it reached the first balcony in 1465, when the works were discontinued until 1482; one side is supported by a single arch, completed 1513, at a height of 375 feet, and the gallery above shortly afterwards; the works were stopped 1583. It is also said to be 319 ft., and 348 ft. HOPK and MURRAY, and 375

French ft., and about 400 ft., out of the 423 ft., or 600 or 620 ft. intended height. The steeple is curiously stated in the ENCYC. BRIT., edit. 1842, art. Arch., to have been destroyed in the bombardment of 1582; or of 1578 as stated by another writer. The skeleton clock dial is 48 ft. diam. There do not appear to be any published details of this structure; but a view is given in CONEY, *Ancient Cathedrals*, fol., London, 1832, p. 19.

The choir of the church of Our Lady was built 1500-1646, the chapels 1530-40; the transepts 1545. The pulpit, supported by figures of the four evangelists, is by W. KERRICX. S. John's is also a three-aisled cruciform church, dating about 1464-80, which escaped pillage by the Gueux 1578-80. The pulpit is by Verhaegen. S. Catherine's was erected at the end of the thirteenth century (or commenced in 1336, as stated in STAPPAERTS). SS. Peter and Paul, formerly the church of the Jesuits, was built 1669-76, by L. Fayd'herbe; the façade 1709. The church of the Béguinage, dedicated to S. Mary Magdalene, was founded 1290, but the rebuilding was commenced 1629, by J. Franquart, and continued 1640-74 by L. Fayd'herbe; the interior, of the Doric and Corinthian orders intermixed, is 216 ft. long by 109 ft. wide, and 78 ft. high. Notre Dame de Hanswyck was rebuilt 1663-78, by L. Fayd'herbe, having a fine octagonal cupola 117 ft. high at the crux. The high altar 1700 is by L. Van der Meulen. The church of the Priory of Leliendaël was built 1662 by L. Fayd'herbe. The archbishop's palace is modern. The diocesan seminary, founded 1500, has about 450 students. The *halles* commenced 1340 were carried up as far as the ground floor and the turret; additions in the sixteenth century were made by R. Keldermans (1530), for Charles V (the plans are preserved in the town records); and further works were carried out in 1610; a design by Bauwens was made about 1858 for its completion as a municipal palace.

WATERS, *Belgique*, 8vo., Brux., 1846, p. 86-100. STAPPAERTS, *La Belgique Mont.*, 8vo., Brux., 1844, ii, 238-55. WEBB, *Ecclesiology*, 8vo., Lond., 1848, pp. 10-12. 14. 28.

MEDA (GIUSEPPE DA), of Murales, died 1537, aged 62. One of the same name was amongst those consulted on the works at the cathedral of Florence about 1560; FRANCHETTI, *Storia*; and a G. da Meda, of Milan, also a painter, is noticed in LOMAZZO, *Idea—della Pittura*, 8vo., Bolog., 1590; and in NAGLER, *Lexicon*, s. v., who gives to him the dates 1565-95.

MEDAL. Ancient money pieces collected for their rarity, or modelling, or peculiarity of device, have received this name. A collection has been illustrated by DONALDSON, *Architectura Numismatica*; or, *Architectural Medals of Classical Antiquity, illustrated and explained by comparison with the Monuments*, 100 illust., 8vo., London, 1859. 6.

Commemorative medals of ancient or modern times are valuable historical records. The Papal Mint at Rome possesses a fine series; and the Government of France have constantly had struck medals and medallions on the occasion of the erection of some of their finest monuments; most of the medals which Denon ordered to be struck in commemoration of the incidents of the first empire, were designed by Lepère. Royal personages, Societies, and Institutions have adopted this form of according honour or reward.

MEDALLION. A medal of a larger size than the ordinary coinage. Medallions were never used as current coin; whereas medals were sometimes allowed to pass in circulation as money. *Roman Medallions in the British Museum*, 8vo., Lond., 1874, with 60 autotype plates. 14.

In architecture it is also the name given to any circular or oval tablet on the face of a building, carved in relief, with figures, heads, animals, foliage, etc.; such are the medallions of the Cæsars at Hampton Court; and at Somerset House are several examples of the use of them.

MEDEENET-EL-FAYOUM or Meedinet-el-Fyoóm. A town in Central Egypt, situated near the mounds marking the site of the ancient Arsinoë or Crocodilopolis; BRIZON notices

some fragments of granite columns and statues. Here were the celebrated lake Moeris and the Labyrinth.

The following places are situated in the province of the same name, besides the two pyramids of crude bricks about 70 ft. high at the entrance of the valley. At *Biggig* is a prostrate obelisk of red granite, and broken in half, 43 ft. long, 6 ft. 9½ ins. wide at the lower end, and about 4 ft. wide, with a circular top; it is engraved in BURTON, *Excerpta Hierog.*, cir. 1824; described in Pocock, i, 59; and the EGYPTIAN ANTIQ. of the *Library of Entertaining Knowledge*, 8vo., Lond., 1832, i, 318-21; it is said to be of same age as that at Heliopolis, which bears the name of O-irtesen I. At *Biahmoo* are two curious stone ruins. At *Kasr Keroun*, or *Kharoon*, is a temple of hewn stone of good style of masonry 94 ft. by 63 ft., and 46 ft. high, which contains fourteen chambers and two staircases, with another ruin and other works which appear to be of the Roman period, and to mark the site of the ancient Dionysias. At *Dimay* or *Nerba* is a raised pavement or *dromos*, about 1290 ft. long, leading to a building of stone and brick, 109 ft. by 67 ft., divided into several apartments, and surrounded by an outer wall of crude brick, 370 ft. by 270 ft. Further to the east, at *Kom Waseem el Hogar*, or *Kom Wesheem el Haggar*, are perhaps the ruins of Bacchis, where may be traced the direction of the streets and plans of many houses. *Description de l'Égypte*, 8vo. and fol., Paris, 1821-9, iv, pl. 69-72. 14, 28.

MEDEENET HABOO. A village in Egypt, built on part of the site of ancient THEBES.

MEDEENET ONTHOLEE. A village in Egypt, marking the site of the ancient ANTINOË or Antinoöpolis, built by Hadrian.

MEDIAN ARCHITECTURE. Media was the third of the five great monarchies of the ancient world. It was situated near the south and south-west parts of the Caspian sea, and was about 600 miles by 250 miles, being considerably larger than Assyria and Chaldea put together. The following list of the monarchs of Media with their dates, may be useful for comparing with their contemporaries. DEIOCES, B.C. 710-657; PHRAORTES, 657-635; CYAXARES or UWAKSHATARA, 635-595; ASTYAGES or ASTAHAGA 595-560; TIGRANES 559 to 545 the fall of the Median empire by the revolt of Cyrus. LENORMANT, *Manual of Oriental History*, 8vo., Lond., 1869. The most important of all the cities in Media were the two Ecbatanas, then Rhages, Bagistan (the latter rather as a palace)—Concobar, Adrapan, Arpadan, Charax, Kudrus, Hyspaestes, etc.

The southern ECBATANA or Argbatana, the Hagmatan of the ancients, was built on the site of the modern Hamadan. No researches have yet been made for the ancient structures. It was chiefly celebrated for the magnificence of its palace, erected by Semiramis, but most probably commenced by Cyaxares; it was about 1420 yards in circumference; the pillars of the main buildings and of the courts were of wood, as noticed by POLYBIUS, x, 27, § 10: they supported beams leaving square spaces filled in with woodwork, above which was a sloping roof covered with silver plates like tiles. Sir R. KER PORTER, *Travels*, ii, 115, saw in 1818 the base of a stone pillar, probably of much later date. There are also the remains of a colossal lion about 11 to 12 ft. in length (p. 321).

The modern town of Takht-i-Suleiman perhaps occupies the site of the northern Ecbatana, which bore in later times the names of Gaza, Gazaca, or Canzaca. Raga or Rhages was situated at almost the extreme eastern limits of the Median territory, and was probably the modern Kuleh Erij, near Veramin, where there are considerable remains of an ancient town. Charax may have been at Uwanukig. Bagistan at the now famous Behistun, where Semiramis formed a park, etc., and had her own effigy carved. Adrapan is the modern Arteman. At Concobar, now Kungawar, Semiramis erected a palace and laid out a park, and there, in the time of ISIDORE, was a famous temple of Artemis, of which some ruins may remain. Aspadan is the modern ISPAHAN.

Except the capital (ECBATANA) and the two important cities

of Gazaca and Rhages, the Median towns were insignificant. They are not supposed to have been walled. Even those cities themselves were probably of moderate dimensions, and had little of the architectural splendour which gives so peculiar an interest to the towns of Mesopotamia. Their principal buildings were of a frail and perishable material, and have consequently disappeared; and in the whole of Media, modern researches have failed to bring to light a single edifice which can be assigned with any show of probability to the period of the empire (p. 277). A stately dress and a new style of architecture are almost the only inventions to which the Medes can lay claim (p. 312). RAWLINSON, *The Five Great Monarchies*, 8vo., London, 1862-66; and 2nd edit., 1871.

MEDLEVAL ARCHITECTURE (Fr. *L'architecture du moyen-âge*). This term has been freely used during the present century for the styles of architecture invented during the middle ages, and more commonly called "Gothic": the history of which has been detailed in this work under the names of the countries. LETAROUILLY, *Rome Moderne*, 4to., Paris, 1860, p. 130, defines the term as "l'architecture du moyen-âge ou des siècles de barbarie" as existing from the fifth to the fourteenth century inclusive. SELVATICO, *Sull' Architettura in Venezia*, 8vo., Ven., 1847, pp. 117, 155, 237; places "l'arte delle età mezzane" from 500 to 1475-8.

The *Dictionnaire Raisonné de l'Architecture Française du XI^e au XVI^e siècle*, 8vo., Paris, 1854-68, in ten volumes, by VIOLLET-LE-DUC, is the most complete work on the architecture of this period, but it is almost limited to that country; as is also his *Essai sur l'Architecture Militaire au Moyen-âge*, 8vo., Paris, 1854; translated by M. Macdermott, 8vo., London, 1860; and his *Dictionnaire raisonné du Mobilier Français de l'époque Carlovingienne à la Renaissance*, 8vo., Paris, 1855, and 1858; to which may be added LACROIX, *Les Arts au moyen-âge et à l'époque de la Renaissance*, 4to., Paris, 1869. It is much to be regretted that no architect has undertaken to describe and illustrate in a similar way the same period in Great Britain; although parts of the style and buildings have been ably treated in very many publications too well known to require a list under this heading.

MEDIANUS (middle). A term used by VITRUVIUS, 3, c. iii, in the words "acroteria mediana altiora octavā parte quam angularia"; and at end, "capita limina mediana autem sint solidas"; also, 3, c. i, "quaternas medianas columnas in fronte et postico"; and "Intercolumnia mediana". Thus it seems to indicate the middle as an usual term, and to be applied to the middle columns in a portico, where the intercolumniation is enlarged.

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MEDICI (IL PRINCIPE DON GIOVANNI DE'), brother of the grand duke of Florence, Ferdinand I (1587-1609), designed 1603-4 that third sacristy which, when carried out by M. Nigetti, took the place of the one designed but not commenced by Vasari, under Cosmo I, to the church of S. Lorenzo at Florence: it is the central one (at back of the choir) having a cupola. According to a very elaborate statement in BALDINUCCI, he also submitted a design with one order for the front of the cathedral of Sta. Maria del Fiore in a competition, which resulted in the preference of one with two orders by G. Silvani; whereas LA METROP. FIORENTINA, 4to., Florence, 1820, pp. 38 and 63, observes that nothing is known of any such competition 1588-1621, or, indeed, before that of 1634-5, in which this prince's name does not occur. The name of PIERO DE MEDICI occurs in the same work, pp. 66 and 67.

According to MILIZIA, he also designed the church of Ogni Santi de' Frati dell' Osservanza, for which a design and model had been made by Nigetti. The design for the rebuilding 1604-48 of the church SS. Michele e Gaetano has been attributed to Medici: it was carried out by Nigetti and the Silvani.

*J. W. F.

MEDICINE, SCHOOL OF. Gondouin's *L'école de Médecine*, formerly *l'école de chirurgie*, at Paris, was published by him, fol., Paris, 1780; and it is also given with the

alterations by A. de GISORS, 1835, in NORMAND, *Paris Moderne*, 4to., Paris, 1846, pt. 2, pl. 122-4. GRANVILLE, in plates for his unpublished work, *Actual state of science in France*, fol., gives plans of the clinical school and the *pharmacie centrale*.

MEDINA of the Saracens; see CITTÀ VECCHIA in the island of Malta.

MEDINA, EL, or MEDENET EL NEBY, the city of the prophet. It is only noticeable as containing the mosque, smaller than, but similar to, that at MECCA, in which is the tomb of Mahomet, or Mohammed. It is carefully described in PENNY CYCLOPEDIA, Supp.

MEDINA (PEDRO DE), of Guadalajara, completed 1559, at Yunqueira in the diocese of Toledo, the stone tower with two octagonal upper storeys which had been commenced 1535 by M. Regil, who died 1536, but the church was not begun until 1559 by N. RIBERO.

MEDINA CEMENT. A cement manufactured by Messrs. Francis of London, from stone carefully selected and obtained from among the older tertiary deposits in the neighbourhood of Christchurch and Romsey, on the South Coast of England, and carried in small vessels to the works at Gravesend, where it is burnt in a kiln and ground. It is of a yellowish red colour; very quick setting; and as it attains its maximum strength in a very short time, it is very valuable for tidal purposes; it is also useful for casting, for concrete, and for ordinary building works. The tensile strength in a few days of a 1½ in. square block has been found to be as much as 400 lbs., but its usual breaking point is from 200 to 300 lbs. after having been forty-eight hours under water.

MEDIOLANUM AULERICORUM. The Roman name of EVREUX in France.

MEDIOLANUM INSUBRIUM. The Roman name of MILAN in Italy.

MEDIOLANUM SANTONUM. The Roman name of SAINTES in France.

MEDRANO (JUAN), a Spaniard, residing at Palermo in Sicily, erected 1737 the theatre of S. Carlos at Naples, which was rebuilt 1815; and designed 1734-59, for Charles III, the palazzo reale di Capo di Monte in the same city; the works being directed by A. Carasale.

MEDRESSEH (Fr. *Medrèet*). The Turkish name, used in descriptions of towns, for a religious school attached to a mosque, which, with a public fountain, were erected as an act of piety by individuals. TIEBER, *Asie Mineure*, fol., Paris, 1839-49, gives, i, pl. 17-8, that of Sultan Mourad, at Broussa; pl. 98-9, the *Medrèet bleu* at Konieh with a coloured plate; pl. 105, the gateway of a medresseh of the Seljoukides; and that of schah sultan Hussain, at Ispahan, in his *Arménie*, fol., Paris, 1842, i, pl. 76-8. In the environs of the mosque of sultan Mahomed II at Constantinople are eight medressehs founded by that monarch. Al Mustanser Beliah, thirty-sixth Khalif of the race of 'Abbas (1226-42), founded and endowed 1228 at Baghdad, a medresseh or college called after him, and described by the Arabian writers as the most splendid and extensive endowment ever established by any khalif of his house.

The medressehs or colleges at Bokhara are not remarkable for their fine architecture, although some, as that of Zergheran, have the front wall ornamented with coloured tiles. They usually consist of a four-cornered or square building, having in the centre a court of a similar shape, sometimes with a few trees. The edifice consists of two stories; the upper one is occupied by the students, and the lower one used for the lectures. The total number of medressehs is set down at one hundred and three, the chief one having 150 cells, the whole amounting to 9,000 or 10,000 students; KHANUKOFF, *Bokhara*, transl. by BODE, 8vo., London, 1845, p. 105.

MEDUNA (TOMMASO and GIO. BATTISTA), brothers, and engineers, were employed to rebuild the theatre of La Fenice at Venice, after the fire of 12 Dec., 1837 (the design 1790-1

of G. A. Selva), as shown in CICOGNARA, *Venezia*, fol., Venice, 1840, ii, 107, pl. 277-9.

MEDUSA (HEAD OF), see GORGONS. In sculpture the head of the dying Medusa is sometimes represented as most beautiful, sometimes most appalling. In the Strozzi head at Rome, her look is deathlike; on a jasper at Florence, it has two serpents, whose tails are twined together under her chin, and their heads reared over her forehead; the eyes greatly convulsed. This form of mask in relief was one of the grotesque representations of forms of terror which occupied a considerable rank in the plastic art of the Greeks. FAIRHOLT, *Dict. of Terms in Art*, 8vo., London (1870), s. v.

MEE (ARTHUR P.), was a pupil of Sir John Soane; he commenced exhibiting at the Royal Academy of Arts in London in 1829; sending in 1831 a drawing of the Roman forum sketched on the spot; 1834, additions to upper Hare Pool Park, near Newmarket, for the Hon. General Grosvenor: 1835 he designed the proprietary school at Gravesend; 1837, exhibited design of an English villa then erecting on the banks of the river Elbe, near Hamburg, for R. Godeffroy, Esq.: 1838-39, was associated with A. de Chateaufort of Hamburg in competing for the new Royal Exchange, London; they obtained the second premium of £200; CIVIL ENGINEER, etc., *Journal*, 1839, ii, 437: 1844 his design was selected for the town hall at Wolverhampton; and also 1846, he joined with W. Webb, in competing for the Fishmongers' and Poulterers' almshouses at Wood Green, near London, which were erected 1847-8. In 1850 he superintended extensive reparations to S. George's Hospital, Grosvenor Place; in 1859 added the upper story to it; and in 1868 erected the new wing. Up to 1854 he was a fellow of the Royal Institute of British Architects, and 1849-50 member of the Council. He died 19 Sept., 1868.

MEEANMILILE. A very hard, fine, close-grained, and heavy wood of Ceylon.

MEER. A piece of fresh water, ranking in size between the lake and the pool, it being frequently too large to be deemed a pool, and too small, as well as too round in its form, to deserve the name of a lake. The effect of adapting two separate meers in one, at Tatton Park, is described and illustrated in LONDON'S REPTON, *Landscape Gardening*, 8vo., Lond., 1840, pp. 72-4.

Meer or mere is a term used in Germany and Holland for large extents of inland lakes, such as the well known Haarlemmer meer. The term is also recognised in England in the names of Windermere, Whittleseamere, Uggmere, etc. In the former country, as they are from 10 to 20 feet below the level of the lowest point of the natural outfall in their districts, they have to be drained by mechanical means, as windmills, and steam power.

MEETING BAR. The top bar of a lower sash of a window, and the bottom bar of an upper sash, which meet when both sashes are shut. On the lower one is usually fixed the sash fastener.

MEETING HOUSE. The assembly room of the Society of Friends, or Quakers commonly so called. Occasionally each sex has a room of its own, containing a platform with benches, and opposite to it are raised seats or pews for the audience; sometimes there is a gallery. The meeting house in Mount Street, Manchester, is said to be the largest in England; it is a stone-fronted structure erected 1838, and capable of seating 1200 persons; it cost £8,500.

The meeting houses of New England, America, as first erected, are described in TUTTILL, *Hist. of Arch.*, 8vo. Phil., 1848, pp. 241-2, with a cut.

MEETING STILE. (Gr. *Σκαπτοι*; Lat. *scapi*.) The upright framing of folding doors; or of a French casement window where the two leaves meet in the middle when shut, as shown s. v. ESPAGNOLETTE BOLT, and FRENCH CASEMENT. Details are also given in POCOCK, *Modern Finishings*, 4to., London, 1811, pl. 57; and in most works on joinery, which

also exhibit some of the ways of guarding against the entry of wind and water.

MEGACLES. His time and parentage are unknown; see ANTIPHILUS, with whom he worked.

MEGALE CHORA. The present capital of the island of SAMOS, and near the site of the ancient city of the same name.

MEGALITHIC ERECTIONS. Besides the remarks which have been printed *s. v.* CELTIC ARCHITECTURE, and the list of books given therein, and in DRUIDICAL ARCHITECTURE, it may be useful to add the following general observations and later publications. These large stoned structures, throughout the world, present certain constant identical features, which are probably characteristic of a fixed period. This might probably not be synchronous in all parts of the world, but that in each country it evidenced and indicated an invariable datum. There was subsequently a decline from that regularity, which accompanied and resulted from the introduction of metallic instruments. This may be designated as the pseudo-celtic or transition period, when various other forms of interment occurred both in and near the former structures, rendering a careful investigation most necessary to distinguish between them. This is done, with a carefully compiled table of structures and their definite technical appellation, by LUKIS, *On Megalithic Sepulchres in the Channel Islands*, read in 1853 and 1854 at SOCIETY OF ANTIQUARIES, *Transactions*, 4to., London, 1835, xxxv, pp. 232-258, and given in CIVIL ENGINEER, etc., *Journal*, 1835, xvi, pp. 432-4; and in the *ATHENÆUM Journal* of March 5. He observed (1) that "It is a generally received opinion that the Celts were the authors and architects of these megaliths; they are, however, found universally distributed from Scandinavia to India; and in America, especially in the north. It must further be observed that the same types of construction and use are equally universal, and that they are usually situated near the sea or the vicinity of some extent of water. It is evident from the universal distribution, likewise, of identical forms of the stone implements accompanying them, that the cromlech-building races sprang from one central typical stock. Central Asia and the site of Nineveh produce genuine Celtic relics. 2. Monoliths are memorial and monumental, and mark the site; advantage is very rarely taken of the proximity of elevated spots, which would increase the solemn character of these imposing masses, had this been desirable; and (3), The type of megaliths in England is the DOLMEN, or chamber with erect props. The type of those in Brittany is the CIST or chamber formed of laterally recumbent blocks. The true form of a cromlech or chamber of long triangular area, with the only entrance at the apex, is seen in the magnificent examples of Gavv 'Innis, in the Morbihan, those on the coast of Normandy, and in the Channel Islands." CYCLOPEAN ARCHITECTURE. A paper read before the Architectural Society of Northampton by Sir Henry DRYDEN, *On the Megalithic Monuments of Brittany*, given in abstract in BUILDING NEWS *Journal*, 1868, xvi, 733. WARRING, *Stone Monuments, Tumuli, and Ornament of remote ages*, etc., fol., Lond., 1870. FERGUSSON, *Rude Stone Monuments in all Countries, their age and uses*, 8vo., Lond., 1873; who, in his *Handbook*, places the megalithic period in England during three hundred years, from the departure of the Romans to the establishment of the heptarchy.

There exists within three hundred miles of the British capital of India a tribe of semi-savages who habitually erect dolmens, menhirs, cists, and cromlechs, almost as gigantic in their proportions, and very similar in appearance and construction to the so-called Druidical remains of Western Europe. Col. YULE, in *BENGAL ASIATIC JOURNAL* for 1844, has described the Khasia people of East Bengal. Dr. Hooker and Dr. Thomson resided amongst them for some months a few years after, and found in one spot a nearly complete circle of menhirs, the tallest of which was 30 ft. out of the ground, 6 ft. broad, and 2 ft. 8 in. thick: and in front of each was a dolmen or cromlech of pro-

portionately gigantic pieces of rock, whilst the largest slab hitherto measured is 32 ft. long, 15 ft. broad, and 2 ft. thick. Several then seen had recently been put up.

MEGALOPOLIS, the modern Sinano. One of the most recent of the Grecian cities, and the later capital of Arcadia; it was founded B.C. 370, and finished in the course of three years; and was nearly six miles in circumference; it was situated on the river Helisson. Little of it now remains except a colossal theatre, 480 ft. in diameter, which is very perfect; it is said to be, with that at Mantinea and a small one in Asia Minor, the only instance of a Grecian theatre built in a plain. The middle *diazoma* is visible, as are also broad flights of steps on the outside of the end boundary walls of the *colonnade* leading to the different *diazomata*: there are no vestiges of the scene; the area of the *colonnade* exceeds a semicircle, with the extreme boundary walls diverging: DONALDSON, in STUART, *Antiq. of Athens*, fol., Lond., 1830, iv, 34, note. A considerable portion of the walls, and the gates of peculiar arrangement, still exists; the agora is another most important structure, which is carefully described by PAUSANIAS, viii, 30-32; a plan is given in SMITH, *Dict. LEAKE, Morea*, 8vo., London, 1830, ii, 31. BLOUET, *Morea*, fol., Paris, 1833, ii, pp. 43-56, pl. 36-40.

MEGARON, see CERES.

MEGARON. A term used in HOMER, *Iliad*, where he describes the palace of Hector, who does not find Andromache in the *megaron*; Achilles describes the *megaron* at Phthia: the *oikos*, called the well constructed *megaron* of Agamemnon, and the *oikos* of Menelaus, are enumerated. In the *Odyssey*, it is noticed, that from the *megaron* the guests all retire from banquet, each to his separate abode, *oikos*. In the same chamber, at the fire, Ulysses humbly stations himself: he has to pass the *aule* to enter the *megaron*. ISWOD, *Erechtheion*, fol., Lond., 1827, pp. 55-6, 63-4.

MEGEONGEE. The native name of a wood of Tavoy, East Indies. It is a very large tree used in house building; and is probably light, as a cubic foot weighs only 38 lbs., 9 oz. 71.

MEGLIAVACCA (MELCHIORRE). One of the architects employed on Milan Cathedral, as stated in HAWKINS, *Gothic Arch.*, 8vo., London, 1813, p. 194, quoting from VITRUVIUS, edit. by C. Cesariano, fol., Como, 1521, p. 377.

MEGUYER (Maître JEHAN), a mason of Orleans, was employed upon the works of the cathedral in that city. COMITÉ HISTOR. DES ARTS, etc., *Bulletin*, 8vo., Paris, 1842-3, ii, p. 469.

MEHEREME. A term used by William of WYRCESTRE, *Survey of Bristol*, 1480, and stated by DALLAWAY, *Discourses*, 8vo., London, 1833, p. 175, to mean "*mærenium*, framework of timber." MERIMNIUM.

MEHMOODABAD, in Guzerat, in Hindostan. The Roza or tomb of sultan Mehmood, is noticed *s. v.* MAUSOLEUM.

MEHRAB or MIHRAB. The Arabic name for a recess and the most ornamented portion in the sanctuary of every mosque, indicating that point of orientation called *Kiblah*, which is placed in the direction of the KAABA at MECCA; thence the name is sometimes given to the whole sanctuary. GIRAULT DE PRANGEY, *Arch. Arabe*, 8vo., Paris, 1841, p. 25, who gives, pl. 7 in the atlas, the mehrab at Cordova. COSTE, *Arch. Arabe*, fol., Paris, 1839, gives several examples in Cairo.

MEIDA (ASENSIO DE); an error for MAEDA (JUAN DE).

MEIDAN. The term given in Persia, India, Egypt, and Turkey, to a market where the shops surround the principal area (BAZAAR). The shahmeidan at ISPAHAN surpasses in magnificence any place for a similar purpose in Europe (*s. v.* for illustrations); that at Tauris has several times held 30,000 men in order of battle; and on one side of that at Kermanshah is the palace of the governor.

MEISL, see HARDTMUTH.

MEISSEN or MISNIA. One of the oldest towns in Saxony, founded about 928 by king Henry I. It is situated fourteen miles north-west of Dresden, on the river Elbe, at its junction

with the Meisse. The stone bridge, rebuilt after 1813, was blown up in 1866. The *schloss*, now one of the largest private buildings of the mediæval style in all North Germany, was formerly the residence of the margraves (who transferred their residence to Dresden in the thirteenth century), of the burgraves, and of the bishops; it was almost entirely rebuilt 1471-83 by "Meister Arnold, out of Westphalia"; and additions were made 1520-24. In 1676 it was restored after the thirty years' war, and the name Albrechtsburg given to it. Since 1710 it has been used for the manufacture of the celebrated Dresden porcelain; it is illustrated in PUTTRICH, *Denkmale der baukunst*, 4to., Leipzig, 1844-50, iii.

The bishopric was founded 958 or 968 by Otho I. There are no remains of the first cathedral; the present one, dedicated to S. John the Evangelist and S. Donatus, is situated within the general precincts of the fortress; it was commenced 1266, and finished in its principal parts 1312-42. It is 241 ft. long, including the porch, nave, and choir; and the nave and aisles are 63 ft. 6 ins. wide; the nave itself 28 ft., and 64 ft. high to the vaulting. The western towers have been more than once injured by tempest and lightning. The choir and transepts are of late thirteenth century date, the nave of the fourteenth; this and the aisles are of equal height: "though marked by many of the faults of German design, it is still a beautiful example of well-understood detail"; FERGUSON, *History*, 1870. A *lectorium* used by the cathedral authorities on certain occasions, is elevated on an arcade, and separates the choir from the transept; it dates 1342-70; such examples are of rare occurrence. The western porch of the nave dates in the fifteenth century; before it is placed the *fürstengruft kapelle*, or mortuary chapel for the princes of Meissen, built 1423-25; it has many brasses, those dating about 1500 being finer than any in England or Flanders; on the south side of it is a smaller mortuary chapel, built 1534, but of inferior design. The south-eastern tower, between the choir and the cloisters, is surmounted by a spire of open work 60 ft. high. There are cloisters on the south side of the choir; and a baptistry adjoining the nave and southern transept. This edifice is well illustrated in PUTTRICH. URSINUS, *Die Domkirche*, 4to., Dresden, 1782; KLEMM, *Der Dom*, 8vo., Meiss., 1835. REINHARD, *Die Stadt Meissen*, etc.

The town or Frauenkirche; the present S. Afrakirche 1295-1329; the S. Martin's church, 12th century; the Wasserkirche, 14th century; and the monastery and church of the Heiligen Kreuz, 1217-23, near Meissen, now in ruins, are also given in PUTTRICH. The custom-house, formerly the large and magnificent church of the Franciscans; the town house; the cloth hall; and the Afraunum, formerly the convent of S. Afra, a large and richly endowed college, with several collections, deserve notice.

14. 28. 50.

MEISSONIER, commonly Meissonnier (GIULIO AURELIO), was born 1695 at Turin. He made a design (which was not carried out, but was engraved) for the church (as usually stated) of S. Sulpice at Paris, in which city he practised chiefly as an ornamentist (in a style "tourmenté et bizarre"; AICARD, *Patria*, 8vo., Paris, 1847, p. 2185). He designed the fireworks at Versailles on the birth 1729 of the dauphin, the father of Louis XVI; also a large residence for the Sieur Berthous, the plans, etc., of which were engraved about 1740 by Allouis or Allais. He was also a goldsmith, and in 1736 "dessinateur de la chambre et du cabinet du roi"; and died 1750 at Paris. BLONDEL, *Cours*, 8vo., Paris, 1772, iii, 349-51: who states, vi, 498, that Meissonnier made a design for the reconstruction of the grand portail of S. Sulpice; for a church and hall for the meetings of the chevaliers of the Order of S. Esprit; and for the decoration of the choir of S. Germain l'Auxerrois. The volume of Meissonnier's designs for decorations of rooms and ornaments, many of them being orders from other countries, entitled *Œuvres*, engraved by Huquier, fol., Paris, n. d., is very rare; many of the plates have been re-engraved by DESTAILLEUR, *Recueil d'estampes*, fol., Paris, 1863. DESTAILLEUR,

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Notice sur quelques Artistes Français, 8vo., Paris, 1863. DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1856, p. lxxxviii. JAL, *Dict. Crit.*, 8vo., Paris, 1867.

3. 5.

MEJIA DE LA VALLE (JUAN), born at Albuquerque in Estremadura, in Spain; went to Carthage, in the West Indies, where he designed the Jesuit College about 1628. 66.

MELAMPUS. He wrote a treatise *On the rules of Symmetry*, and his work was extant in the time of VITRUVIUS (civ. A.D. 10), vii, pref.; viii, ch. 3. The time he flourished is not known.

MELATHRON (Gr. μελαθρον). This word is considered to mean the ceiling, or cross beam of a ceiling; Vulcan suspends his net from this to catch Mars and Venus; a rope hangs from it; and an eagle perches on it like a swallow, probably on the projecting end of some timber; *Odyssey*, viii, 279; xi, 277; xii, 239.

In a more general sense, it may mean the roof, or even the house. From EURIPIDES, *Phœnisæ*, 90, and from HESYCHIUS, s.v., it is supposed to have been the women's apartments; and some writers have thought that HYPEROUM and Melathron mean a range of chambers at the back of a house, or GYNÆCONITIS, which is generally supposed to have been on the ground floor. But this cannot have been the case, as in that passage of the *Phœnisæ*, Antigone goes up the old cedar stair into the μελαθρον ἐς δῆψες ἑσχατον to see the Argive army; therefore this place must have been high enough to look over the city walls, and over the plain. HESYCHIUS interprets δῆψες ὑπερῶν, ἢ νηλμαξ, or the stair itself. He also calls ὑπερῶν, ἀνώγειον, or place above; and in another passage calls the μελαθρον, a place between the beams of the στεγῆς. HOMER, *Iliad*, mentions the beautiful mansion called *doma* and *melathron* of Priam constructed in the Acropolis.

In the pavilion of Rameses IV at Medeenet-Haboo, in Egypt, there are three stories of rooms; and in some of the propylons, it is said, no less than nine stories of chambers might be traced. It seems unlikely that their Grecian neighbours should have houses confined to one story only; especially as PAUSANIAS, v, 10, describes the στοαι τε ὑπὸν ὑπερῶν or internal galleries in the hypæthron of the Temple of Jove at Elis.

*A. A.

MELCHIORRI (.....), built 1767-1800 the S. Antonio bridge over the river Metauro at Fossombrone, near Urbino, in the States of the Church; it is of one arch, and is regarded in Italy as a *chef-d'œuvre*.

MELCK, or MELK, in Austria, see MÖLKE.

MELLENDEZ (DIEGO MORENO), see MORENO MELLENDEZ (DIEGO).

MELLENDEZ (MIGUEL), executed 1689-99 the church and hospital of S. Julian, called la Caridad, at Malaga. 66.

MELFI (the ancient AVFIDUS). A town in the province of Basilicata, in South Italy. It was the first stronghold of the Normans in Apulia. It is surrounded by walls in a very dilapidated state; and has a castle, a tower of which dates 1050-1100, but chiefly from the sixteenth century, and the offices and additions still later; its great hall is now a theatre.

It is the see of a bishop. The cathedral, dedicated to the Assumption of the Virgin, comparatively modern, with its campanile 1155, were nearly destroyed 14 Aug., 1851, by an earthquake, which also destroyed 163 edifices, including six other churches, five monasteries, the palazzo pubblico and chief buildings, besides damaging a much larger number of buildings. LEAR, *Calabria*, 8vo., Lond., 1852, p. 278. CRAVEN, *Excursions*, 8vo., Lond., 1838, ii, 286-91, 311, gives a view of the castle. There are still several convents. 28. 96.

MELIA AZADIRACHTA, the *Neem* or *margosa* tree of the peninsula of India, furnishes a hard, beautifully mottled, wood, which, when old, is difficult to work; it is used for carved images, as it is not liable to the attacks of insects. It is found everywhere in India, of a moderate size, but large in some localities, and deserves attention for cabinet work: it

weighs about 46 lbs. per cubic foot: in Mysore it is called *Yaypachitu*, and there used for beams and posts. The *Melia Azedarak*, the pride of India, called *dek* in Northern India, where it becomes a large useful timber tree, of great beauty, is also much cultivated in North America. The *Azaderach* is the name of a wood used in Egypt for implements of husbandry, etc.; also a wood of Tuscany, there named *Albero di Zaccheo*, and used for cabinet work. One of this species is a large tree of Gualpara, East Indies, there called *tokor*; it is used for planks, canoes, and common furniture. Another supplies the white or bastard CEDAR of New South Wales. 71.

MELIGHINO (JACOPO) of Ferrara, was appointed by pope Paul III (1534-50) to the care of the Belvedere at Rome, and of some other buildings belonging to that pontiff, who inscribed his name on the list of the architects to S. Peter's, with a salary equal to that of A. Picconi da San Gallo; VASARI, iii, 171, iv, 22; who, v, 205, distinctly says that Barozzi da Vignola, when he first went to Rome, worked at the Belvedere with Melighino, for whom he made designs 1534-7 if not 1540.

MELINUM. A colour mixed with wax, and employed by the ancients in encaustic painting: it could not be used on a wet surface, as in fresco painting.

MELLARIUM. The place where the Romans kept bees to make honey; APIARIUM.

MELLEY WOOD, see GRIS-GRIS.

MELLING (ANTOINE IGNACE), born 27 April 1763 at Carlsruhe, and chiefly a painter, became architect to sultan Selim III, and 1795 *dessinateur de la sultane Hadidgé*, his sister, as stated on the title page and on p. 4 of his *Voyage Pittoresque de Constantinople et des rives du Bosphore*, 51 pl., fol., Paris, 1809-19. He directed the decoration of her palaces: and for the sultan he designed a pavilion and a gallery or arcade in his country house of Beschik-Tasch. After residing at Constantinople for eighteen years he returned to Paris, where he died early in July 1831. 112. 113.

MELONE (ANTONIO), of Cremona, a distinguished military engineer, who acquired a high reputation as an architect. In early life he served under Sebastiano Picenardi, an officer of great experience. After passing through the various grades of military service, he was appointed to the colonelcy of an infantry regiment by Francis I, king of France, and was subsequently chosen by the Venetian republic to be governor of Crete, where he designed and constructed several fortresses. Melone, contrary to the opinions of the generals of Henry II, closed up the harbour of Boulogne, thereby compelling the English to surrender (1550), and in the enterprise he lost his life. 57.

MELOS. The modern Milo. An ancient city in the island of the same name, in the Ægean sea. There are extensive remains, consisting of part of an amphitheatre (cleared in 1836 by the then crown prince of Bavaria) having the nine lowest rows of seats of white marble, for the most part remaining; a smaller theatre, 88 ft. 9 ins. diameter, cyclopean walls; a temple of Venus; and numerous subterranean galleries or catacombs. A fine statue of Venus found at Melos is now in the museum of the Louvre at Paris. LEAKE, *Northern Greece*, 8vo., Lond., 1835, iii, p. 77. BLOUET, *Morea*, fol., Paris, 1838, iii, pl. 25-29, gives the theatre, a tomb, and a fine colossal head. CHOISEUL-BOUFFIER, *Voyage Pitt. de la Grèce*, fol., Paris, 1782-1809, i, p. 10. FORBIN, *Levant*, fol., Paris, 1819, gives the catacombs. TOURNEFORT, *Voy. du Levant*, 4to., Paris, 1717; and transl. 1717, i, 145; who mentions eighteen churches and thirteen monasteries, of which in 1834 only a little church remained. DAPPER, *Isles de l'Archipel*, fol., Amst., 1703. PENNY MAGAZINE, 1834, pp. 182, 190, and a view. 14. 23. 50.

MELOS MARBLE, also called ACYTHOS MARBLE, used by the ancient Greeks, was of a yellow colour.

MELOZZO DA FORLÌ is said to have designed the domed tribune called the cappella della Canonica in the cathedral at Forlì; it is sometimes attributed to LAPÌ (p. 23), but it was designed 1490 by P. Bombaci, according to MORONI, s. v. Forlì.

MELTER AND MELTING HOUSE, see FOUNDER and FOUNDRY.

MELZO (AMBROGIO DA) was one of the conclave who conferred with Enrico di Gamondia on the works at the cathedral of Milan from 1 May 1392 until 19 March 1402. GIULINI, *Memorie*, 4to., Milan, 1760-71, xi, 450. 27. 62.

MEMBER. Any subordinate part of an edifice; or a molding in a collection of moldings, as in a cornice, etc.

MEMBRETTTO. An Italian term used in English architectural publications of the seventeenth and eighteenth centuries for a pilaster that bears up an arch. These are often fluted, but not with more than seven or nine channels. They are frequently used to decorate door cases, gallery fronts, and chimney pieces, and to support the cornices and friezes of wainscoting. BUILDER'S DICTIONARY, 8vo., London, 1734.

MEMBURY (DOMINUS SIMON), is mentioned 1403 in the will of William of Wykeham, bishop of Winchester, as the supervisor and paymaster of the works of the cathedral. He was not necessarily a surveyor.

MEMEL. A fortified town and seaport in the government of Königsberg, in Germany, and one of the most northerly towns of Prussia proper. It was almost totally destroyed by fire towards the end of 1854. BUILDER *Journal*, xii, 588. Being situated on the river Danze, and on the east side of the small strait which here joins the Kurische-Haff to the Baltic, and at the effluence of the River Memel or Niemen; it is exceedingly well situated for the trade which its position on the latter river gives it. The Niemen being navigable throughout the greater part of Lithuania, readily enables the great forests with which its banks abound to be utilised in a manner rivalling those of Norway and Sweden. The timber is brought down the river in floats, part being then converted in the town, and the remainder shipped in its bark condition. R. E. P.

MEMEL TIMBER. One of the varieties of the pine timber called FIR, brought to this country under the general name of BALTIC TIMBER, and named, as are most others, from the port at which it is shipped. It is of same description as that shipped from the neighbouring port of DANTZIC; but being cleaner and of finer quality, it is preferred for the better class of carpenter's work; at the same time it is generally smaller, 30 ft. long by about 13 ins. square being the average size: it often, however, runs to 35 ft. or more in length, and sometimes to 15 ins. square. The BUILDING NEWS *Journal*, 1867, xiv, 809, states that "Hewn timbers are generally branded with the hammer at the ends. With Memel shipments, the qualities are marked in the centre with a scribe, thus: I or II for best and seconds; in like manner they will bear the initials of the shipper. Dantzic timber can always be detected from Memel by having a multiplicity of marks in the centre of the timber, thus (X III PD); as these are mostly private marks they are difficult to explain. The custom house scribes can be readily understood, as XXIII for 23 ft., etc." R. E. P.

First class Memel, or CROWN TIMBER, comes in balks 13 ins. by 13 ins., squared and without knots, about 30 ft. in length; some balks are imported longer, but they are not considered good; the usual lengths are 28 to 50 ft. Second class; best middling are 13 ins. square and 50 ft. long, but are more knotty sometimes as "brack timber" is fit only for large scantlings. Second middling, called also brack timber, by which term it is better known, is 13 ins. square and 50 ft. long, and upwards. It is divided from the others on account of the quantity of knots in its entire length, and is therefore only fitted for bond timbers and large scantlings. PENNY MAGAZINE, 1843, xii, 19.

Red pine may be distinguished from Memel timber by observing the ends of the balk—the smallest in fibre is red pine, the broader is Memel; the red pine is short.

MEMEL OAK is used for pipe staves, being much inferior to Riga oak employed for wainscot.

the ancient Celestins at Paris; LENOIR, *Musée des Mons. Franç.*, iii, pl. 114, No. 104; also iii, p. 92, pl. 114 bis No. 456, gives those erected by Henry III in the parish church of S. Cloud. Such are perhaps those of Antonine and Trajan at Rome, and those to cardinal de Bourbon and to Anne de Montmorency, pl. 105 and 135, Nos. 105 and 112. In the recent (1874) excavations at Athens on the Sacred Way near the Agia Triada, outside the Dipylum Gate, among numerous tombs, was found a Grecian Doric column, with capital carrying a vase, and erected as a memorial or monumental column.

MEMORIAL CITY. Augustus, to perpetuate the memory of his great victory at Actium, A.D. 31, built the city of Nicopolis near the bay where he was successful, establishing quinquennial games; and having enlarged an ancient temple to Apollo, adorned it with naval spoils and dedicated it to Neptune and Mars; SUTTONIUS.

MEMORIAL FIGURE. HERODOTUS, ii, mentions two instances, one between Ephesus and Phocæa, the other between Sardis and Smyrna. Both of them represented a man 5 palms high, the right hand holding a javelin, the left a bow; with the rest of his armour partly Egyptian and partly Ethiopian. Across his breast from shoulder to shoulder is the inscription, "I conquered this country by the force of my arms." Who this person is thus represented and of what country are not specified. These were the figures said to have been sculptured by order of Sesostris or Rameses the Great, to commemorate his conquests; the figure seen on the road from Sardis to Smyrna, near Nymphi, is drawn in the CLASSICAL MUSEUM, i, 82-231; DE LANOYE, *Rameses le Grand*, 12mo., Paris, 1866; and 1872, p. 126.

MEMORIAL SLAB, see SLAB and TOMB.

MEMORIAL WINDOW. A window of painted or coloured glass put up in a church to the memory of a person or family. These are now so numerous that nothing further need be said of them. It has been stated that the churchwardens or other authorities having the care of the building are not bound to restore any such window if broken or destroyed. An instance is given, however, of some to be repaired, in SPALDING CLUB, *Aberdeen Burgh Records*, 4to., Aberdeen, 1844-48, ii, 385.

MEMORY, TEMPLE TO. An ancient temple of this name in Carthage, is mentioned in GIBBON, *Decline*, etc., 8vo., Lond., edit. Bohn, 1854, iii, 459 (chap. xxxi), as the place where Heraclius, count of Africa, was beheaded in 413, after his defeat by Constantius.

The Greeks personified Memory under the figure of Mnemosyne, sometimes represented as a young female driving in a nail. The Iconologists also represented her as a middle-aged woman with a head-dress adorned with pearls and jewels, and holding the tip of her ear with the two first fingers of her right hand. RIPA gives her two visages, a black robe, a pen in her right hand, and a book in her left. The dog is often placed by personifications of memory, in allusion to the acuteness with which this sense is displayed by that sagacious animal. PAUSANIAS, i, 2, § 4, mentions a statue of Mnemosyne at Athens; and near the oracle of Trophonius she had a sacred well and throne. 6. 59.

MEMPHIS (Copt. Mefi, Momf, and Menf. The Noph of the Old Testament. The modern Ghizeh or Gheezeh). The first capital of the entire kingdom of Upper and Lower Egypt, situated on the western bank of the river Nile about ten miles south of Cairo. Its foundation is ascribed to Menes, the first mortal king of Egypt; and in the time of ABULFEDA, about 1342, its remains were very extensive; but now little exists deserving of notice except the prostrate colossus of Rameses II (woodcut in SHARPE, *Hist. of Egypt*, 8vo., Lond., 1859, ii, 385), which when erect must have been 42 ft. 8 ins., exclusive of any pedestal. Its necropolis—the PYRAMIDS—was the tomb of the kings of every native dynasty.

The modern village of Metraheneh or Mitranieh, is now proved to occupy the site of the ancient Memphis, as asserted by Major RENNELL; and discovered by Mariette in 1850 or 1851 under the sand, and is so noticed in BAYARD TAYLOR, *Life and Landscapes from Egypt*, Lond., 1855. Mariette, sent out 1850 by the French government to make investigations, and subsequently raised to the dignity of bey, also found (12 Nov. 1851) northward of the great pyramid of Sakâra and to the west of the great alley of the sphinxes, an entrance to a gallery which eventually led to the principal building, which he recognised as the Serapeum. The main gallery extends several hundred yards, and on each side are vaulted chambers containing 31 gigantic sarcophagi of the sacred bull Apis: the galleries and chambers are all hewn out of the rock, the principal one being 16 ft. broad and 14 ft. high: the greater part of the sarcophagi are made of a dark green granite (the quarries of which are unknown); they are from 12 ft. 6½ ins. to 12 ft. 10 ins. long, 7 ft. 7 ins. broad and 7 ft. 7 ins. high, exclusive of the cover which is in one solid block 3 ft. 3 ins. thick. They had been opened probably by the Persians under Cambyses.

LITERARY GAZETTE *Journal*, 1853, p. 210: 1854, p. 1037. DONALDSON, *Sessional Papers* of Royal Inst. of British Architects, 1861; and in BULLER *Journal*, xix, 119. MARIETTE, *Le Sérapéum de Memphis découvert et décrit*, 36 large plates, fol., Paris, 1857-63.

At Ghizeh, Gizeh, Geezeh, or Jizeh, a village on the left bank of the river Nile, about four miles south of Cairo, are situated four of the well known pyramids, which are continued at intervals for a distance of seventy miles southward. The pyramid of Khufu or Suphis I, the Cheops of HERODOTUS, the largest of them, was 764 ft. square, but is reduced to 746 ft., and covers nearly 13 acres; the height is 456 ft.; the platform at the summit containing 1067 square feet, is reached by 203 steps. The interior, entered 47 ft. 6 ins. above the base on the north side, contains numerous chambers, one of which, the king's chamber, is 34 ft. 6 ins. long, 17 ft. wide, and 19 ft. 3 ins. high; it contains a red granite sarcophagus. The architect of this pyramid, dating about B.C. 3426 or 3229 (EGYPTIAN ARCHITECTURE), is stated to have been Eimai, by CHAMFOLLION, *Lettres écrites d'Égypte*, 8vo., Paris, 1833, and to have been superintended by MERHET. The pyramids are illustrated in the *Description de l'Égypte*, pl. 3, text 5; PERRING and VYSE, *Pyramids of Ghizeh*, fol., London, 1839-42; GAILHABAUD, *Monumens*, 4to., Paris, 1842-52, i; LEPSIUS, *Denkmäler*, fol., Berlin, 1849-59, Abth. II, pl. 19-22, 96; GROBERT, *Descr. des Pyramides de Ghize*, 4to., Paris, an. ix.

Close to the great pyramid is the well known colossal forepart of a figure cut out of the solid rock, and usually called the sphinx; it is fifty yards long. Among the ruins at this place may be seen the supposed earliest instances (cir. 600 B.C.) of the arch construction.

MEMPHIS MARBLE, Memphites, is also called APHITES; See BRECCIA for a modern quarry.

Cairo is still supplied with a magnesian limestone from quarries at Toora Masarah on the eastern bank of the river Nile, which quarries supplied Memphis and its vicinity on the western bank, as well as the casing of the pyramids of Ghizeh; EGYPTIAN ARCHITECTURE, p. 22.

MENAGE. A word employed from the Fr. *ménage* for the place (RIDING HOUSE) appropriated to the purposes of horsemanship and teaching the art of riding. PLINY has left a description of his building. 6.

MENAGER or MESNAGER (JEAN FRANÇOIS JULIEN) was born at Paris 24 March 1783, and became a pupil of de la Gardette. He obtained 1800 the first *grand prix* for a design for a school of the fine arts, engraved in *Projets d'Arch.*, fol., Paris, 1806. While at Rome, he made a restoration of the temple to Antonine and Faustina. At Paris he designed the pedestal for the statue of Louis XIII and the four foun-

tains in the *place Royale*. He exhibited in 1819 a model of the fountain S. Sulpice, which does not now exist. For the prefecture of the Seine he designed the market for charcoal, rue de la Roquette; and the market for fodder for the faubourg S. Martin, rue Lafayette. He was a member of the jury of the school of architecture; and conducted a studio for pupils. 110.

MENAGERIE (Fr. *ménage*). The collection of animals not naturally associated in one establishment, as well as the buildings necessary for their housing and preservation, especially when rare and foreign. The great points to be attained are that the conditions of the animal's confinement should assimilate as nearly as possible to those of its wild state.

The principal means for accomplishing this end is by giving due attention and prominence to proper warming arrangements, cleanliness, and ventilation; the whole to be completely under the control of the attendants as may be required. Different arrangements are necessary for different classes of animals. For instance some, such as the hippopotamus, require a piece of water sufficiently large for swimming, which for others, such as lions, is unnecessary. Others, again, being climbers, require either trees or artificial rocks, etc.; while birds must have sufficient space to exercise their wings in stretching or in flying. All these points necessitate the consideration and knowledge rather of the naturalist than the architect, but it is essential that he should be at least well informed of the requirements for which he is to provide. For many classes of animals the information given under **AVIARY**, **KENNEL**, **STABLE**, etc., will be sufficient for the professional man.

The various zoological gardens; Lord Derby's menagerie at Knowsley-park, Lancashire (lately broken up); that at Schönbrunn, near Vienna; with the Jardin des Plantes at Paris, are examples. The gardens of the Zoological Society in the Regent's Park, London, are most complete; many of the buildings have lately been erected under the direction of A. Salvin. R. E. P.

MENALIPPUS, probably of Athens, with Caius Mutius and Marcus Stallio, Roman architects, was employed by Ariobarzanes II (Philopater) king of Cappadocia about B.C. 63-51; to repair the odeum at Athens injured in the siege by Sylla, B.C. 86-5. **VITRUVIUS**, v, 9; **PAUSANIAS**, i, 20, § 4; **БОЕКХ**, *Corps Inscr.*, i, No. 357. 59.

MENANDRES, son of Parrhesias. A name found on two Greek coins, and given as an architect by **FELBIEN**, *Vies*, 4to., Paris, 1696, p. 64, quoting **GOLZ**, but is most problematical.

MENDE. A town situated north-west of Nîmes in France, on the river Lot. It has a great number of public fountains; the old episcopal palace is now the prefecture. The cathedral, dedicated to the Virgin Mary and S. Peter, was commenced 1362. Having been greatly injured in 1580, a large portion was rebuilt, and consecrated 10 Oct. 1620. Part of the *chevet* is *ogivale secondaire*. The north bell tower is built of a fine *grès* stone, and the upper part richly carved. The west end is given in **LABORDE**, *Monuments de France*, fol., Paris, 1816, ii, pl. 177, p. 21. 50.

MEANDEACA (**ANDRES DE**), see **LIZARAN** (J. DE).

MENDELLA or **MONDELLA** (**GALEAZZO**), is asserted to have been the father of **FALCONETTO** (G. M.).

MENDEZ (**ANTOINE**), 1578 was one of the masters of the works at the building of the monastery of BATALHA, in Portugal. **RACZYNSKI**, *Les Arts en Portugal*, 8vo., Paris, 1846, p. 227.

MENDIVE (**CHARLES**) was the architect employed to construct in the cathedral de la Seu at Zaragoza the great work of the archbishop Hernando de Aragon, which appears to mean the capilla de S. Bernardo, founded there about 1550. 66.

MENDIZABAL (**JOANES DE**) was *maestro mayor* at the cathedral at Cuenca 1559, succeeding Juan Velez, with a salary of ninety thousand maravedis. 66.

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MENESTHES, erected a (pseudo-diptyral) temple to Apollo, probably in Magnesia, counterfeiting a double row of pillars. **VITRUVIUS**, iii, 1.

MENESTRO, "an ancient and great architect", as mentioned in **LOMAZZO**, *Trattato*, 4to., Milan, 1585, p. 691; perhaps in error for the person above named.

MENIA (**RAFAELLO**), of Modena, was well studied in **EUCLID'S** *Elements*. He constructed the public bakehouses (afterwards pulled down for the site of the monastery of Sta. Teresa of the Barefooted Carmelites); and also the portico of the piazza, which terminates at the back of the choir of the cathedral. He was invited 1615 to Bologna, and subsequently to Parma, in both of which cities he erected numerous edifices; amongst others, the public bakehouses in the former city. He also built his own dwelling house in Terra Nuova, at Modena; two sculptured heads of his design surmount the doorway. 35. 93.

MENIANE. French and Italian terms for small terraces, balconies, or boxes, either open, or closed with Venetian blinds, from which the occupants are able to look out without being seen. 25.

MENIANUM, see **MAENIANUM**.

MENICUCCI (**GIOVANNI BAPTISTA**) worked with **CANEPIA** (M. DA) at the front of S. Carlo in Corso at Rome, and did the façade 1690 of SS. Ambrogio and fol., commenced by O. Lunghi; **ROSSI**, *Insig. Romæ Templ.*, 4to., Rome, 1684, pl. 52. The cupola and other parts were by P. Berretini. See M. LUNGI. 28.

MENSA. The late Latin term for the upper immovable slab of stone of one piece, laid on a cube of stonework in an altar. **WALCOTT**, *Sacred Archaeology*, 8vo., Lond., 1868.

MENSAL CHURCH, *de mensa episcopi*, was served by a vicar or stipendiary priest; the tithes were appointed to furnish the table of the bishop; he was parson and titular or rector. **SHAW**, *Hist., etc., of Moray*, 4to., Elgin, 1827, p. 328.

MENSOR ÆDIFICIORUM. A vocation similar to that of the measuring surveyor of the present time (*æstimator juratus*). Pliny the younger, writing (A.D. 103) from Prusa to the emperor Trajan, asks him to consider whether it would not be needful for him to send out a surveyor (*mensorem*), because, on examining the accounts for the public works executed, it was evident that no small amount of money might be reclaimed from the undertakers of the works if the measurements should be faithfully performed. The emperor replied that he had scarcely sufficient surveyors for the works which he was carrying on in Rome and its vicinity, but that surveyors in whom reliance could be placed were to be found in every province; **C. PLINII CÆCILII SECUNDI**, *Epistolæ*, x, 28-29. The responsibility of the mentor for the fraud is set out in the *Pandects*, xi, Tit. vi, Art. iii, "Si mentor falsum modum dixerit", **POTHIER**, *Pandectæ Justinianæ*, 4to., Paris, 1818, i, 462-3; also **VOET**, *Commentarius ad Pandectas*, 8vo., Halle, 1778, ii, 712; and **BRISSON**, *De Formulæ et Solennibus Populi Romani*, fol., Halle, 1731, p. 493. **GRUTER**, *Inscrip. Antiq.*, fol., Amst., 1707, p. DCXXIV, 1 and 2, gives an inscription to the memory of a *mentor ædificiorum*, on one side of whose tomb was engraved a measuring rod, which may have been a quincupeda or a decempeda; on the other side writing implements, and in front a box or casket with rolled up plans above (*chartæ convolute*). **GRUTER** gives several sepulchral inscriptions, at p. DXCIX, 1; p. DCXXIII, 6, 7, 8; p. DCXXIV, 3; and others may be found in **MURATORI**, *Notus Thes. Vet. Inscript.*, fol., Milan, 1740, ii, p. CMLXIV, 8; CMLXII, 1; CMLX, 5; CMLXII, 8; CMLXXVI, 8. **KENRICK**, *Roman Sepulchral Inscriptions*, 8vo., Lond., 1858, p. 29. **MENSURATOR**. A. G.

MENSURATION. The art of ascertaining and setting forth the dimensions and contents of all bodies, either in their superficial or solid capacity; and explained in the contents of the work by **NESBIT**, *Treatise on Practical Mensuration*, in ten

parts, 12mo., London, 1816, which contains: Methods of drawing geometrical figures; mensuration of superficies; land-surveying; mensuration of solids; the use of the carpenter's rule; timber measure, and valuing standing timber; artificers' works, illustrated by the dimensions of a house; mensuration of haystacks, drains, canals, marlpits, ponds, mill-dams, embankments, quarries, coal-heaps, and clay-heaps; conic sections and their solids; the most useful problems in gauging according to the new imperial measures; plane trigonometry, with its application to the mensuration of heights and distances; and lastly, trigonometrical surveys.

MENSURATOR. A designation formerly inscribed (SELVATICO) on the twenty-first capital in the canal front of the doge's palace at Venice, according to RUSKIN, *Stones, etc.*, 8vo., London, 1853, ii, 360, under the figure of a man shoveling fruit into a tub (or measure), probably a *mentor frumentarius*, a corn and fruit meter. **MENSOR.**

MENTZ, see MAINZ, in Hesse Darmstadt.

MENTZINGER (HANS) of Basel, was *baumeister* at the *münster* of Freiburg in Breisgau, from 1533 until about 1554.

MEO DI CECCO, of Ferrara, in the fifteenth century, worked on the towers of the cathedral of that city.

MEO, of Orvieto, was employed 1330 as *capo maestro* at the duomo in that city; two sons of L. Maitani were appointed to superintend the works.

MEQUINEZ, MEQUINAS, or MEKENES. A city in Morocco, occasionally the residence of the emperor. The houses being one storey in height, it occupies a large space of ground. A large palace was erected by the sultan Muley Ismael, after his own design, he having determined to make it the capital of his northern dominions. A city of Roman foundation may still be discovered near Mequinez, the extreme object of their power, and almost of their geography. JACKSON, *Morocco*, 4to., London, 1809, p. 126.

MERAB, see MEHRAB.

MERBIDERY. A town near Mangalore, in the province of Canara, in Hindostan. The architectural remains show it to have been a place of great extent; the pagodas are of hewn stone; the largest being a stately edifice, having the pillars and roof sculptured in a very elaborate manner. The inhabitants are principally of the Jain religion.

MERCANTI (GABRIEL) was 1630 employed on the works at the duomo at Orvieto, being the last architect before the consecration of the edifice 13 Nov. 1676.

MERCER (JOHN), esquire, on 31 Aug. 1761 succeeded Chris. Wren, esq., who "was removed from being clerk of His majesty's works", to which he had been appointed 19 Jan. 1715. *HISTORICAL REGISTER*, ii, 361.

MERCHANT'S HOUSE. That of the celebrated Jacques Cœur at Bourges commenced in 1443 is described by COSTELLO, *Jacques Cœur and his times*, 8vo., London, 1817, p. 111, and illustrated in the works noticed *s. v.* BOURGES. It was bought by the Government of France in 1858, in order to be then restored. One of the seventeenth century, demolished 1842, is given in *MONITEUR DES ARCHITECTES*, xiv; VIOLLET LE DUC, *Dictionnaire*, art. Maison; VERDIER AND CATTOIS, *L'Arch. Civile*, 4to., Paris, 1855-57; and GAILHABAUD, *Monumens*, 4to., Paris, 1842-52.

MERCHANT'S HALL, or Sale-room. The *Halles* at Rouen have been said to be the finest in the world; the one allotted to the merchants is 272 ft. by 50 ft.; those for the drapers and for wool are each 200 ft. long; for corn, 300 ft., all French measure: these surround a square court. Their prototypes at Bruges and at Ypres are very superior, as stated by BRITTON AND PUGIN, *Normandy*, 4to., Lond., 1828, p. 25. That at Bruges, an isolated block, 275 ft. 6 in. long, by 142 ft. 9 in. wide, was built 1284-1383, and later. At Ypres, the cloth hall, *les Halles*, with the hôtel de ville, are 436 ft. 8 ins. long; the whole of the ground floor was formerly one immense hall, and,

though now subdivided, some of the rooms still measure 164 ft. by 98 ft. 6 ins. The *halle aux draps* at Paris consists of immense halls, which are lighted by fifty windows: the *halle aux vins*, erected 1811 for Napoleon I, is divided into fourteen halls and ninety-one cellars, capable of containing 200,000 hogshheads of wine.

The *halles* at Bourges, perhaps the largest in France, are formed of five large and long alleys or streets, all under one roof. The middle one is for merchandise and haberdashery, and is so spacious that at feasts and on Sundays it is the great meeting place. In the two alleys on each side are the benches of the bootmakers, rope makers, and others; the first of the other alleys contains the shops of the weavers; while the other has the corn chandlers and the corn market in one half, with the meat market in the other. In fact, these *halles* form a small town; FONÉRE, *Narration*, Lyons, 1619, extracted in BAUX, *Bourges*, 8vo., Bourges, 1849, p. 31: who, p. 62, states that a clock was placed in the tower of the *halle* about 1527.

MERCIER (JACQUES LE), was born at Pontoise between 1580 to 1585; "about 1585" is stated by JAL, *Dict. Critique*, etc., 8vo., Paris, 1867. He sojourned for a long time at Rome, where 1607 he made engravings of the design by Buonarroti for the church of S. Giovanni de' Fiorentini; 1608 the statue of Henry IV of France, erected in S. Giovanni de' Laterano in that year; and 1620 author of his own design for the catafalque, consisting of a Doric Order without any base, used at the funeral 1 July 1610 of Henry IV.

On his return to France, the Louvre was entrusted to him by cardinal Richelieu; whereon le Mercier pulled down the central circular keep with the northern and eastern sides of the old court; and then began the enlargement of that court to its present size; firstly, by continuing (to double the length of the original design) the southern and western façades, erected 1546-78 in the old court by LESCOR; secondly, by erecting on the northern and eastern sides two other fronts similar to the prolonged work, so as to complete the quadrangle; this extension is sometimes said to have been originally contemplated by Lescot; le Mercier added four pavilions, one in the centre of each front, in order to break the uniformity of the long lines. Only one of these, the pavillon de l'Horloge or des Caryatides (SAUVAL, ii, 28) with a vestibule of the Ionic Order on the ground floor and a chapel over it, in the centre of the present western side facing the Tuileries, was executed by le Mercier; and the vestibule is called by D'ARGENVILLE an imitation of one built by Buonarroti, or rather by A. (Picconi) da Sangallo in the Farnese palace. The attic of this pavilion, having three superposed pediments, as shown in an illustration engraved in the *Grande Marot, l'Arch. Française*, fol., Paris, 1727-51; and in BLONDEL, *Cours*, iii, 56, pl. 4, was ornamented by eight caryatide figures worked by Pierre Sarrazin (whose pupil Gilles Guérin carved two groups of caryatides on the left side), and was surmounted by a square dome. The first stone was laid 28 June 1624 by Louis XIII, but the works made slow progress, and were interrupted 1643 at the death of the king, so that le Mercier finished only the lower portions of the western half of the new northern side, and of the northern half of the western side; the rest of the court on this plan was completed for Louis XIV (1664) by le Vau, who, on these two sides, altered the height of the attic, and placed there a third range of columns. The Order is given in BLONDEL, *Cours*, ii, 199, pl. 87-8.

Five years after the beginning of the works at the Louvre, the cardinal directed le Mercier to construct two other important edifices, viz., his own palace on the site of the hôtels Mercœur and Rambouillet, and the Sorbonne. Little now remains of the primitive hôtel de Richelieu (principal entrance and view in the *Grand Marot*), called in succession palais cardinal, royal (1639), d'Orléans (1692), Briou, and again royal. It was commenced by le Mercier 1629, and completed 1636 (SAUVAL, *Histoire*, fol., Paris, 1724; BRICE, *Descr. de Paris*, 12mo.,

Paris, 1725; and BLONDEL, *Arch. Franç.*, fol., Paris, 1752-56, iii, 38, and plates; he did the *portail*, which was subsequently known as the great gallery and the state apartments, inclusive of the *galerie des poudres*, situated on the western side of the second court, and so called from the prows of vessels, which, with anchors, etc., were introduced on the piers between the windows of the ground floor, in allusion to Richelieu's post of "surintendant de la marine et de commerce". Because these marine attributes appear at the château de Richelieu, in Poitou, they may show the period at which le Mercier was employed there. MERCIER, *Plans, Elevations, etc., de la magnifique chateau de Richelieu*, 17 double pl., obl. 4to., Paris, n. d.; this building is stated to be unique in France, and complete in all its parts; D'ARGENVILLE; BLONDEL, *Cours*, iv, 177. The parish church there is also assigned to him, but is omitted in the list given by VIRLOYS, *Dict.*

The foundation stone for the collège de la Sorbonne (pl. 84 in the *Grand MAROT*; BRICE, iii, 166-177, was laid 4 June, 1629, and for the church in May 1635 (BLONDEL, *Cours*, iii, 318). The latter has two façades: the principal one, consisting of a Composite over a Corinthian Order, faces the place de la Sorbonne; the other, or northern one, with a hexastyle portico of the Corinthian Order, faces the court formed by the buildings intended for the schools; its dome swells the list of second-rate (as to size) cupolas; the interior, arched upon piers, is his best work, and was finished 1653. BLONDEL, *Arch. Franç.*, ii, 76, and plates. It once contained the beautiful white marble tomb of its founder, erected 1694 by Girardon (BRICE, iii, 163). Except the high altar, the tribune, and the *portail*, which were subsequent works (1745) by Caqué, le Mercier completed 1628-30 the church of the Pères de l'Oratoire in the rue S. Honoré, by adding the choir in conformity with the original design by C. Métezeau (*Arch. Franç.*, iii, 55, and plates; the order is given in *Cours*, ii, 177, pl. 82; the design for the high altar was engraved by MAROT). BRICE, i, 215, attributes the tabernacle on the high altar to Louis Abel de Sainte-Marthe, general of the congregation. Many years later, about 1650, le Mercier was engaged to continue for Anne of Austria the church of the abbaye de Val de Grace from the level where F. Mansart had left it when the walls were only 9 ft. above the ground (*Arch. Franç.*, ii, 62, and plates); he lengthened the church by the addition of the chapelle du S. Sacrement, and finished to the height of the lower cornice the edifice, leaving the rest to be carried out 1654 by P. Le Muet and G. Le Duc, who finished it (*Cours*, iii, pl. 52). His latest important undertaking was the church of S. Roch in the rue S. Honoré, of which the first stone was laid 1633 (sometimes stated 1653, BRICE, i, 253, states 1655); it was inaugurated by the king in 1653; the choir and part of the nave were long left unroofed; after the death of le Mercier the nave was lengthened; the *portail* 1736 was designed by R. de Cotte, but executed by his son (BLONDEL, *Arch. Franç.*, iii, 119, and plates).

Le Mercier died poor at Paris in 1660, as always stated; but "in Nov. or Dec. 1654" as discovered by JAL; this is somewhat verified by the date 1653 which is written in the table of contents at the end of the third volume of LAMBERT, *Hist. Litt.*, 4to., Paris, 1751, in the British Museum Library, which has in it the book plate of "Ant. Duchesne, prévôt des bâtimens du roi". His tomb was in the church of S. Germain de l'Auxerrois.

Among his other constructions but of minor importance are: the château at Rueil or Ruelle, and the *portails* of the parish churches at Rueil, and at Bagnolet; the church of the Dames de l'Annonciade at Tours; the famous staircase in the form of a horseshoe at the bottom of the court du cheval blanc in the palace at Fontainebleau, which cost 100,000 écus (about 300,000 fr.); the hôtel de Liancourt, afterwards de la Rochefoucault in the rue de Seine and faubourg S. Germain, engraved in the *petit MAROT*; the shrine of the chaise de Ste. Geneviève de Mout, composed of four columns of the Ionic

order, the two in front being of "grosse brèche", placed behind the high altar, BRICE, ii, 490; a façade as an entrance to the Louvre, which was engraved by MAROT, and also given in *Arch. Franç.*, iv, 52; the completion of the interior of the great gallery between the Louvre and the Tuileries, but his arrangements on the walls were first altered by Poussin, and afterwards by others; 7 May 1631 plans, etc., for the new fortifications and works of the canal in connection with the Seine, for which Richelieu gave him Jean Tiriot, master mason, as an assistant; the château de Versailles as it was under Louis XIII, 1627; and a design for the hôtel de ville at Lyon, 24 April 1646; and for drawing the *coupe des pierres* of the staircase for which he was paid 106 livres, DESJARDINS, *Notice*, 8vo., Lyon, 1861; and his *Hôtel*, etc., fol., Paris 1867, p. 5; ROUYER ET DARCEL, *L'Art Arch. en France*, 4to., Paris, 1863-66, i, 71. SAUVAL, i, 330, accords to him the hôtels and the châteaux Deffiat, d'Emery, de Chilli, and the collège du Plessis; and states that to him was left the decision of the position for the *portail* of the church of S. Luigi de' Francesi, at Rome, for which he made the plan and laid the foundations (the elevation attributed 1589 to J. della Porta is given in RUBENS, *Insig. Romæ Templ.*, fol., Rome, 1684, pl. 39; ii, 23; the repair of the grand staircase of the Louvre, made for Charles V by Raimond du Temple, mason to the king; with ii, 34, the queen's bath room in the Louvre; i, 463, the *portail* to the church of the Jesuits in the rue S. Antoine for cardinal de Richelieu; and iii, 47, the theatre of the palais royal.

JAL states that Mercier had the title of "architecte du roi" in 1618, in which year he drew 1200 livres as a pension; as "premier architecte" he received 1639 the sum of 3,000 livres for his salary; and he also received 1500 liv. tourn. by his brevet of 19 Oct. 1646 from the queen. His portrait (after MORIN, *Illustrious men of France*) is given by T. Holloway in LAVATER, *Essays*, 4to., Lond., 1789, iii, 373.

The following publications, besides those referred to in the text, may be consulted; QUATREMÈRE DE QUINCY, *Vies*, etc., 8vo., Paris, 1830, which gives the plan and elevation of the court of the Sorbonne; FONTENAY, *Dict. des Artistes*; CLARAC, *Musée*, etc., du Louvre, 8vo., Paris, 1841, i, 361, 439, 588; VITET, *Le Louvre*, Paris, LEGRAND ET LONDON, *Descr. de Paris*, 8vo., Paris, 1808; BORDIER ET CHARTON, *Histoire de France*, 8vo., Paris, 1860, ii, 335-6. 3. 5. 25. 34. 112.

MERCURY. As the god of merchandise he is represented with a purse in his hand, and with a winged cap on his head. He was also esteemed the god of eloquence and of all gainful arts, the inventor of the harp, and of wrestling; the patron of thieves, the presider over highways, and the guide of passengers, in which capacity terminal statues, or HERMES, were in later times erected to his honour in the public roads. He was called, among the Greeks, Jupiter's messenger; his distinguishing attributes being the petasus or winged cap, the talaria or wings for his feet, and the caduceus or wand with two serpents about it; also the harpé, or long sword, with a particular hook behind it. PAUSANIAS, viii, c. 17, 52, notices that citron wood alone might be used for statues of this god. 6.

In DONALDSON, *Architectura Numismatica*, 8vo., Lond., 1859, No. XXV, a medal is illustrated representing the tetrastyle elevation of a temple or tabernacle of Mercury, the central intercolumniation being occupied by a statue of the god. Instead of four columns, there are male terminal hermes with the phallus, surmounted by a circular pediment, the outside margin of which is fringed with a serrated ornament. The tympanum of the pediment is filled by his attributes, the tortoise, the cock and the ram, as also the winged helmet and the magic purse.

A temple to Mercury should be placed either in the forum or the great public square; VITRUVIUS, 2, vii; who also, viii, notices a temple to Venus and Mercury at Halicarnassus. One was built to him as early as B.C. 495, near the circus maximus at Rome, *Livy*, ii, 21, 27. 78.

MERCURY. A liquid metal commonly known as quick-

silver. The point at which it becomes solid is about 72° Fahr. below the freezing point. Bisulphuret of mercury produces CINNABAR or vermilion. Bichloride or perchloride of mercury is CORROSIVE SUBLIMATE, a violent poison, used in the Kyanizing process for the prevention of DRY ROT in timber. CHROMATE OF MERCURY is a pigment.

14.

MERE or MERR, see MEER.

MEREMIUS, see MERIMNIUM.

MERHET, Prince, probably a son of Khufu or Cheops, king of Egypt, was superintendent general of the royal buildings, as his grave was on the west side of the pyramid of Khufu, and he may have overlooked the erection of the great pyramid. His chamber was removed to Berlin by LEPSIUS, as stated in *Discoveries*, 8vo., London, 1853, p. 39-40. It is about 70 ft. long, 45 ft. wide, and 15 ft. high. LEPSIUS, *Denkmäler*, fol., Berlin, 1849-59.

MERIDA (the Latin Emerita Augusta). A city in the province of Estremadura in Spain, situated on the river Guadiana, which is crossed by a Roman bridge of eighty-one (sixty-four semicircular, MILITIA) arches, being 2,575 ft. long, 26 ft. wide, and 33 ft. above the bed; it was built by the emperor Trajan; and was repaired 1610 for Philip III; some of the arches were destroyed in the wars of 1812. Merida, in point of stupendous and well preserved monuments of antiquities, is the Rome of Spain, it having been rebuilt by the legate Publius Carisius 23 B.C., under Augustus, and was 2416 Spanish veras or yards long from north to south, and 1960 from east to west. The triumphal arch to Trajan, 44 ft. high, now called the arch of Santiago, is stripped of its ornaments; the ruins of the castle added to it by the Moors, afterwards the episcopal palace, then that of the Templars, is now called *el Conventual*; the temple to Diana or to Mars, now built into the house of the count of Corbois, has 19 fluted granite columns, 40 ft. high, with Corinthian capitals; the theatre is almost perfect, wanting only the proscenium; the amphitheatre or *naumachia*, with the circus, 1356 ft. by 335 ft., are in good preservation. The remains of the Roman aqueduct consist of ten arches in three tiers, with 37 piers each some 90 ft. high, and nearly perfect, form one of the grandest remains of classic antiquity (*Detached Essay*, Aqueduct, p. 17 and pl. iii, fig. 8); while the houses, the churches, the immense walls and towers, and the pavements, abound in and exhibit Roman fragments, etc.

Another aqueduct crosses the Madrid road, having only three arches left standing, probably the one built by Almansur, king of Cordova, *cir.* 1000; and another built by the Maestro Esquivel, under king Philip II, which conveys water from a spring near Truxillanos, about six miles distant. The ancient works are described in FORD, *Handbook of Spain*, p. 258, etc. In the vicinity is a Roman bridge quite perfect, having four arches, 450 ft. long, by 25 ft. wide; the original pavement still exists. At a distance of one and two leagues respectively are two reservoirs, of Roman or Moorish architecture; the first, called *Albufera*, is about 100 ft. long, by nearly 60 ft. in depth, enclosed by thick walls with two fine towers; the other, called *Albuera*, is smaller, but its walls and the single tower which surmounts them are much finer. The *Monumentos Arquitectonicos de Espana*, fol., Madrid, 1859-68, gives in pl. 2, ornamental fragments in the construction commonly called "llamada cisterna", as works in the Latin Byzantin style. There are very few illustrations of the structures above mentioned. PONZ, *Viage de España*, 8vo., Madrid, 1776-94; LABORDE, *Itinéraire*, fol., Paris, 1834, iii, 399, 3rd edit.; and *L'Espagne*, fol., Paris, 1806, giving a plan of the town and view of the bridge. SEMPLE, *Journey*. COOK, *Sketches*. TAYLOR, *Voyage*, 4to., Paris, 1826-42, gives a pillar and the temple to Diana. *Historia de la ciudad de Merida*. ATHENÆUM *Journal*, 4to., 1828, i, 78. DONALDSON, *Arch. Numismatica*, 8vo., Lond., 1859, illustrates a medal of the city exhibiting a fortified gateway, and gives some account of the antiquities.

28.

MERIDA. The capital of Yucatan in Central America. It was founded 6 January 1542, and has a Moorish aspect. The cathedral, built soon after that period, is of a nondescript style, having small windows with semicircular arches; the projections from the walls may almost pass for buttresses; the ornaments over doors and windows are in cement. The building is about 350 ft. long, with walls 60 or 70 ft. in height, and very solid. This, with the bishop's palace, occupies one side of the *plaza mayor* in the centre of the city, 400 or 600 ft. square. There are about fourteen churches in all. ECCLESIOLOGIST *Journal*, 1849, ix, 185. WALDECK, *Voyage, etc.*, fol., Paris, 1838, pp. 18, 57; and NORMAN, *Rambles, etc.*, 8vo., New York, 1843, p. 35; 2nd edit.; but neither work gives any illustrations.

MAYAPAN.

50.

MERIDIAN. In the heavens the meridian is the circle which passes through the pole and the zenith of the spectator; on the earth it is the circle which passes through the pole and the spectator's position; consequently the terrestrial meridian is the section of the earth made by the plane of the celestial meridian, and is therefore a line passing due north and south. In 1701, under pope Clement XI, the prelate Bianchini had drawn on the pavement of the church S. M. degli Angeli at Rome, a fine meridian, with the signs of the zodiac in colored stones, 45 metres 715 in length: on the Baths was placed the gnomon. LALANDE, *Voyage en Italie*, 12mo., Ven., 1769. Such a line is found at Sta. Maria del Fiore at Florence; at the duomo at Bologna, and elsewhere. They are traced on brass rods let into the pavement, and marked with the signs, and otherwise graduated. An opening in the roof permits the sun's rays to fall on them at his culmination, thus marking noon as well as his height each day in the heavens.

1.

When the variation of the needle was first discovered by Norman and Burrough in London in 1580, it was found that the magnetic axis deviated from a true meridian line as much as 11° 15' to the east. A few years afterwards it was discovered that the angle of deviation was slowly diminishing. In the year 1657 the needle appeared to lie in the direction of the geographical meridian of London. From that time to the year 1820 the needle advanced to the west; the variation then was 24° 18'. The observation which was taken in 1838 indicated a variation of 24, and in 1852 it was about 22° 16'. BUILDING NEWS *Journal*, 1870, p. 124.

MERIMNIUM, Maeremium, Maerennum, Maremium, Marienum, Marrenum, Maheremium, Mahermium, Meremium, Merennum, Mererum, Merrenum, Merramentum, Merreamentum, Merremmentum, Merrenium, Merannum, Muremium; and the old French words *Marronner* 1277, *Maronage* 1622, *Mairien et marrien*, *marisme* and *mahereme*, from whence it is supposed to be derived. A late Latin word, found written in the above variety of spelling, and used in mediæval records to denote building materials of timber or stone, but seldom the latter. It is applied rather to waste or refuse materials than to those fit for use. KENNETT, *Parochial Antiq.*, 4to., Oxford, 1819, in Gloss. DOLACIO MEREMII.

19. 80.

MERK. A *merk* or rental land should contain sixteen hundred square fathoms, and the *ure* is the eighth part of a merk, but the dimensions are very variable, scarcely two being of the same size; EDMONDSTON, *View of the Zeland Islands*, 8vo., Edinb., 1809, i, p. 147.

MERLE (MAITRE PIERRE LE), and M. Jehan Meguyer, were masons of Orleans, and employed upon the cathedral of that city; COMITÉ HISTORIQUE DES ARTS, etc. *Bulletin*, 8vo., Paris, 1842-3, ii, p. 469.

MERLIANO, sometimes written MARLIANO (GIOVANNI), born 1478 at Nola, wherefore he is often mentioned as Giovanni da Nola, was the son of a leather merchant, became a pupil of A. Agnello del Fiore at Naples about 1498, afterwards studied at Rome, and finally settled at Naples. As the leading sculptor of his time, he executed in that city many works, of which a list is given in the Introduction to the *Handbook* (and

in DOMINICI): amongst the best are the tombs of the three Severini 1516, in the church of SS. Severino e Sossio; the sculptures in the Liguori chapel in the church of Monte Oliveto, and the tomb of Pedro de Toledo, viceroy 1532-1554, in the church of S. Giacomo degli Spagnuoli; for that patron he added the statues of S. Michele, S. Antonio Abate, and S. Sebastiano, to the top of the arch of Alfonso in the Castel Nuovo. He principally directed the festivals in honour of the triumphal return 1535 of Charles V from Tunis, including an arch 86 ft. high, 78 ft. wide, and 45 ft. deep, with three openings in front, and one in each flank, decorated with coupled columns of the Corinthian order, on the piazza di porta Capuana. He built 1540 the church of S. Giacomo degli Spagnuoli, in the Largo del Castello; and that of S. Giorgio de' Genovesi in the strada Medina; in both cases having the assistance of his pupil F. Manlio; he reduced 1540 the Castel Capuano into the form of a palace accommodating the tribunals of justice, the prisons being on the ground floor; he designed the palace which was built by Paolo di Sangro, prince of Sansevero, in the piazza di S. Domenico Maggiore, but, after being remodeled in the last century, was subdivided about twenty years ago into small residences; and the palace 1549 built by don Alfonso Sanchez in the piazza di S. Giovanni Maggiore, which was rebuilt about 1650 by cardinal Filomarino, and since has been known as the palace of the dukes della Torre of his family. Besides executing 1532 the statue of Atlas (which has disappeared) for the fontana dell' Atlante in the Largo del Pennino or della Selleria, which still has dolphins by his hand, he adorned the end of the mole with a fountain, from which the statues of four rivers were taken to Spain by Federico de Toledo, marques de Villafranca, viceroy 1671, who also then removed some statues and steps, supposed (*Handbook*) to have been his work, from the fontana Medina; he executed the fontana Coccavaia in the Strada di Porto; and 1541 the fontana Scapellata, behind the chiesa della Nunziata; besides another in the Largo di Sta. Lucia, sometimes called the fontana Merliano. He laid out the strada di Toledo according to MILIZIA (not at Toledo, as in the English translation), who adds that he went with other artists to Spain by order of Pedro Antonio de Aragon, viceroy 1666-71, in order to embellish his gardens; whereas Merliano died 1559 or 1560. BIOGRAPHIE DEGLI UOMINI DEL NAPOLI, 4to., Naples, 1830, v. 3. 25. 28. 36. *J. W. P.

MERLINI (DOMENICO) of Brescia, was chief architect to Stanislaus II, Augustus Poniatowsky, king of Poland (1764-95). His principal works are the grand concert room, the royal library, and the dining room, in the palace at Warsaw. He designed 1780 the royal villa Lazienki (this is also attributed to Kramstizer); and Garenne, now that of prince Radzivil, two Italian miles from Warsaw, originally erected at the expense of count Tomatis of Turin. The villa of Jablonna is entirely his own, and one of his best works; and amongst many other buildings, public and private, is the grand church and house of the Scolopi. He died 1792 at an advanced age. Two of his sons survived him. CIAMPI, *Notizie di Medici*, 8vo., Lucca, 1830, p. 90; and *Viaggio*, 8vo., Fir. 1831, pp. 54, 56, 60.

MERLO (CARLO GIUSEPPE), made 1770 designs for the façade of the duomo at Milan, contemporaneously with Vanvitelli, the one retaining the doors and windows in the Italian style, the other in the Gothic style. This was in the possession of Ferrari the engineer. FRANCHETTI, *Storia*, 4to., Milan, 1821, p. 146.

MERLON (Fr. *merlon*; Ital. *merlo*; Ger. *amsehn*). The solid part of an embattled parapet, standing up between the embrasures, both of which are usually finished by a crest. BATTLEMENT, where these parts are properly called the *cop* and *crenel*. BAILEY. Merlon is said to be properly that part of a parapet which terminates by two embrasures of a battery; its height and thickness are usually the same as the parapet; its breadth about 6 ft. on the outside, and 9 ft. within. It serves to cover those on the battery from the enemy's attacks. 2.

ARCH. PUB. SOC.

In the *Album* of Wilars de Honecourt, edited by LASSUS, on the *recto* of the thirty-first leaf, is a view of the outside of one of the chapels of Rheims cathedral, and to which is added "the upper tablement (or entablature) must have merlons", as translated in the edition 1859 by WILLIS, p. 218. On pl. 61 and 62 Wilars has written "there must be merlons (Fr. *cretiaux*) on the tablement to point a passage round about it in case of fire." The existing merlons at Rheims, as shown by LASSUS, are flat on the top, 0.60 wide by 0.24 deep, and 0.16 apart, so as to furnish stepping stones; they are 0.09 high in front, and 0.055 at back, the hinder part of the merlon being rounded off on plan to throw the water along the sloping top of the entablature; a sketch is given; and also one in VIOLETT LE DUC, *Dict.*, ii, 317, where the word *carreaux* is an error; corrected in iv, 33, s. v. *Corniche*. These merlons may be supposed to be imitated in the small projections on the transoms of windows in the Perpendicular period of Gothic architecture.

MEROË. The capital of Ethiopia, which with Dankeloh, the site of the ancient Meroë, is now represented by the necropolis containing the pyramids, most of which have a porch of one room on the eastern side, twenty-one varying from about 17 ft. square to 63 ft. square, and seven others in a very ruined condition; constructed generally of sandstone obtained from the range of hills to the east, which material is rather softer than the Egyptian; the blocks are one foot high, and 2 feet 6 ins. long. HOSKINS, *Ethiopia*, 4to., London, 1835, pp. 66-84, gives several plates of plans, views, and the hieroglyphics, being the first person to represent them. There are 31 pyramids in one group, 13 in another; and three other groups, two consisting of two pyramids each, and the other of six; and at a distance of about 5,600 ft. are the remains of twenty-five more. The slope is formed at a very acute angle, and all possess a roll molding up the angle; they are supposed to date 724 to 680 B.C. PYRAMID.

HOSKIN (p. 73) mentions two stone segmental arches supposed to date from about 700 B.C.; and p. 156 a stone pointed arch of the same date at Gibel Barkal. The antiquities of the island of Meroë consist of these pyramids, the site of Gibel Barkal, the pyramids of Nourri, which are larger than those above mentioned, the colossal statues of Argo, and the temples of Solib and Semneh; pp. 279, 337, 343. FERCUSSON, *Handbook*.

MEROS (Gr.), or FEMUR (Fr. *cuisse*; Ger. *schenkel*). The plain surface between the channels or glyphs of a triglyph. VITRUVIUS, iv, 3.

MEROVINGIAN ARCHITECTURE. The epoch of art in France, ranging from 481 to 751, from Clovis to Pepin. In various parts of that country there are remains which can reasonably belong to no other epoch than the fifth, sixth, and seventh centuries. The style is so peculiar, and so evidently the precursor of Romanesque, and so evidently based on Roman tradition; it is so rude, and the use of ancient material is so very frequent, that it is impossible to name any period to which they can be referred, if not to the Merovingian. Among the most marked characteristics are—the masonry is sometimes in stones regularly squared, and very Roman in appearance, but with long and short quoin stones and dressings to the windows, similar to the Anglo-Norman or Saxon work in England. The openings are round-headed and perfectly plain; vousoirs separated one from the other with two or three bricks; the archivolt decorated with a projecting hoodmold of brick; the doorways are in some cases square-headed, surmounted, however, with a relieving arch similar to those to the windows; sometimes the walls are of *opus incertum* work (*petit appareil*), with bands of Roman brick worked in either in parallel courses, or frequently in *opus spicatum*; and *opus reticulatum* is also found—these are all Roman tradition; triangular ornaments are worked in the courses in brick, and pedimented heads to recesses are frequent, with debased Roman mouldings.

For examples, one of the earliest, perhaps, is the baptistry

of S. Jean at Poitiers, certainly not later than the seventh century; it is fully illustrated in GAILHABAUD, *Monumens Anc. et Mod.*, fol., Paris, 1842-52, ii, and is an interesting specimen of the more ornamented style. The façade of the church of Savenières, near Angers; in DE CAUMONT, *Cours d'Antiquité*, 8vo. and fol., Paris, 1830-43, iv; chiefly of stone, and ruder altogether, with brick bands, of sixth or seventh century; as is also La Basse Œuvre at Beauvais; FERGUSSON, *Handbook*: and the church at S. Genoux, GAILHABAUD, *L'Arch. du Vme siècle*, fol., Paris, 1854, with triangular and circular heads alternately, a very perfect example. Amongst other quoted and partly illustrated examples may be cited—the chapel at Langon (isle de Vilaine); the church at Vieux Pont en Ange (Calvados); crypt of S. Gervais (at Rouen?); one, if not two, remains at Suèvres (Loire et Cher); S. Mesmin, near Orleans; S. Martin at Angers; the church of S. Pierre at Mans; the church of S. Eusèbe at Gennes; and the crypt at Jouarre. Some of these may possibly be early in the eighth century, but before the CARLOVINGIAN period. BATISSIER, *Monumens*, 8vo., Paris, 1845, p. 539-40; and 544, adds the nave of the cathedral at Avignon, according to some authors, but it is probably later, or of the eleventh century. S. Pierre at Rouen is stated to have been commenced by Clotaire I (558-62), by RAMÉE, *Histoire*, 8vo., Paris, 1843, ii, 116-7. SCHAYES, *Histoire*, 8vo., Brux., 1850, ii, 19, notices that, with the exception, perhaps, of the front wall at the cathedral of Tournai, and some small parts (*faibles débris*) of the church of Notre Dame at Maestricht, there do not exist any vestiges of the buildings erected in Belgium under this race of the French kings. A Merovingian cemetery of the seventh or eighth century was discovered at Petit-Appeville, near Rouen, a few years since, and the excavations were superintended during ten days by the abbé Cochet. *J. M. L.

MERSEBURG. A city in Prussian Saxony, situated sixteen miles west of Leipzig, on the river Saale, which is crossed by a large stone bridge. The town is walled, has an old castle originally the episcopal palace with a fine chapel, afterwards the residence of the dukes of Saxe-Merseburg, but is now used as government offices. The cathedral, founded and dedicated to S. Laurence and S. George, was built 1015, and rebuilt at various periods, 1040-50, 1468-1514-1524, 1536, 1544; and in 1661-65-77-86 many alterations were made in the interior, the *fürsten gruft* built, etc.; the west front is late twelfth and early thirteenth century work; the two towers and transepts twelfth century, the terminations later; the two eastern towers eleventh century: a richly decorated portal is given with the date 1480, in KALLENBACH, *Chronologie*, fol., Munich, 1847. The church possesses one of the largest organs in Germany. Otto, *Du Dôm.*, 8vo., 1834; and PUTTRICH, *Denkmale*, fol., Leip., 1836-52, ii, which gives a plan, view, and details of the building: also a plan of the Neumarktkirche and crypt, which has been much altered through necessary repairs, and now affords a good example of the Byzantine style of the twelfth century. He likewise describes the Sixtkirche, now in ruins, dating fifteenth to seventeenth century, with earlier portions: and the Peterskirche, having a crypt of the eleventh and twelfth centuries; the church, of the fourteenth and fifteenth centuries, is now used for a magazine and other purposes; its monastery was consecrated 1091.

There are also to be noticed the old and new town houses, the palace of count Zechi, and several schools, besides other usual public buildings. MÜLLER, *Wörterbuch des Preussischen Staats*, 4 vols. 8vo., 1836. 14, 50.

MERSIS. The name of an architect which occurs in an inscription on the road to Cosseir; LETRONNE, *Recueil*, 4to., Paris, 1842-48, i, 428.

MERSTHAM STONE. The quarries are situated at Merstham, near Red Hill, Surrey. They are of the same chalk formation as those at Godstone, Gatton, and Reigate, and known as FIRESTONE. DORKING LIME. HEARTH STONE. The quarries at Merstham are said to have been long kept in

the hands of the Crown, and to have furnished the material for the old castle at Windsor, as well as for the chapel of Henry VII at Westminster; it was used also by cardinal Wolsey at Hampton Court palace; and later, for the internal parts of Waterloo bridge. It is used as the chief building stone of the neighbourhood; though not generally considered to be suited for tracery and decorative work, it is said that Mr. P'Anson has lately so used it at Lindfield church. But for many purposes it answers well. When first quarried it is dark coloured; but drying to a beautiful white, it tells with excellent effect as applied in some houses at Reigate, where used as quoins to the walling of the ordinary Nutfield stone, which is of a yellow, and sometimes of a dark brown or slaty colour. BUILDER *Journal*, ix, 749; 1856, xiv, 361; xviii, 133. 1. 14.

The Godstone firestone is apt to flake off after hard frosts (xv, 588). This stone is believed to have been used in the oldest part (temp. Henry III) of Westminster Abbey; the Jerusalem chamber and the early portions of the cloister were of this material, which is, in fact, hearthstone; C. H. SMITH, in *Sessional Papers* of Roy. Inst. Brit. Arch., 1859-60, p. 179.

MERSTON (HENRY), was clerk of the works 8th Henry IV, 1407, when he had a certain quantity of cloth given to him for a livery; as stated in *Wardrobe account* of 13 Henry VI, in the BRITISH MUSEUM, Addit. MS. 17,721.

MERTON (WALTER DE), "chancellor, founder, and architect", erected Merton college, Oxford, 1264-70; he died 26th Oct. 1277, and was buried in Rochester cathedral, where his tomb, executed at Limoges(?), still exists. PARKER, at Oxford Architectural Society, 3 March 1861; printed in BUILDER *Journal*, xix, 201; he suggested that this work was far in advance of its age, and compared it to Cologne cathedral. Also ARCHÆOLOGICAL JOURNAL, ii, p. 137.

MERULIUS LACHRYMANS, see FUNGUS.

MESALORIUM. A place adjoining to the ancient churches; see ASPATICUM.

MESAULOS (Gr. μέταυλος, μέσσυλος or μεσσυλλος). A door in the middle of the portico of the peristyle opposite the entrance connecting that of the Andronitis with that of the Gynæconitis. VITRUVIUS applies the name to the passage between the two peristyles, in which was the μεσσυλλος θύρα. By means of this door, all communication between these two portions could be cut off. SMITH, *Dict. of Antiq.*, s.v. Domus, p. 425.

MESSEL HOUSE, see MESSLE.

MESHREBEYEH, see MASHARABEYEH.

MESJID. The Arabic name for a small mosque; its arrangements differ but little from those of an ordinary mosque. JAMA. The sultan Mahommed II alone consecrated one hundred and seventy mesjids at Constantinople.

MESMAKER (JEAN DE), succeeded J. Keldermans at the hôtel de ville at Louvain. COMITÉ HIST. DES ARTS, etc., *Bulletin*, 8vo., Paris, 1848, xiv, 588. 98.

MESOVIVUM or MEVIUM. The ancient name of MAGDEBURG, in the province of Saxony, in Prussia.

MESSALONGI, in Ætolia. The ruins of an ancient city near thereto, exhibiting a gate, pointed archways, and a small theatre, are illustrated in DODWELL, *Cyclopean, etc., Remains*, fol., Lond., 1833.

MESSENE. An ancient city of the Morea, in Greece, now represented by the village of Mavromati, built at the foot of the steep hill Ithome. It was built under the direction of Epamoniadas, B.C. 369; the Thebans and their allies assisted, and the best architects and masons were invited from all Greece to lay out the city, and to arrange and construct properly the temples and other public buildings. There are considerable remains of the walls, which are nearly six English miles in circuit; they are most perfect on the side in which the Arcadian or Megalopolitan gate occupies the centre, one of the finest specimens of Greek military architecture in existence. The towers in the walls are in general about 25 ft. square, projecting about 14 ft. Parts of the stadium, of a small theatre

about 60 ft. diam., and numerous other fragments, still remain. PAUSANIAS, *Messenica*, 4, xxvii and xxxi. At the junction of the Balyra and the Amphitus, near Ithome, is a celebrated bridge known by the name of the bridge of Mazozumeno; it consists of three branches or arms, meeting in a common centre (like that at Croyland, in Lincolnshire), the foundations and the upper parts of the piers are ancient, and may be presumed to belong to the same period as Messene; the arches are modern; CLARKE considers that one at least is ancient; it is about 17 ft. span, and about 13 ft. high from the water. 23.

DODWELL, *Cyclopean Remains*, fol., London, 1834, gives the walls and gate; also GAILHABAUD, *Monumens*, 4to., Paris, 1842-52, i; and STUART, *Antiq. of Athens*, etc., fol., London, 1830, iv, gives the entrance gateway and towers, in two plates by DONALDSON: BLOUET, *Morée*, fol., Paris, 1834-36, contains the plan, stadium, and a monument, pl. 17-36, p. 298-308. LEAKE, *Morea*, 8vo., Lond., 1830, i, 366, 480. LEAKE, *Asia Minor*, 8vo., Lond., 1824, p. 329, notices the odeum as being of a singular form, 112 ft. long and 93 ft. interior diam. MURE, *Journal in Greece*, 8vo., Edinb., 1842, ii, 264. LE PAILLON de BOBIAVE, *Recherches*, etc., 107. E. CURTIUS, *Peloponnesos*, 8vo., Gotha, 1851, ii, 138. W. G. CLARK, *Peloponnesus*, 8vo., Lond., 1858, pp. 232-42.

MESSIDIUS and PHILOXENUS were employed by Quintus Tullius Cicero (killed B.C. 43), the brother of the orator, to construct an aqueduct, of which the remains are supposed to be still visible at Rocca d'Arce on the frontier, in the road between Rome and Naples (between Ceprano and Arpino). 28.

MESSINA (Gr. *Zankle*; Lat. *Messana*; Fr. *Messine*). A town in Sicily. It ranks as a fortress of the first class; the harbour is one of the best in the Mediterranean; fronting it is the *Marina*, a broad quay designed 1622 by S. Gulli, with statues and fountains; and beyond it is a magnificent terrace called *Pallazata*, once lined with noble edifices, but damaged (since partly restored) by the terrific earthquake of 1783, which shook down the most solid edifices of the town; it was also greatly damaged in the siege of four days in 1848. Among nearly fifty churches, is the cathedral dedicated to Sta. Maria, commenced about 1098 by count Roger, with a large crypt; the single granite shafts are supposed to have belonged to a temple of Neptune; the wooden roof was put up soon after 1254; the fine mosaics date 1322; the richly carved white marble pulpit is by Antonio Gagini, who died 17 Nov. 1571 (*Illustrations*, ii, pl. 50), but the building is said to have been entirely destroyed in the troubles of 1860-61. MOREY, *Charpente peinte de la Cath.*, 8 pl., fol., Paris, 1841. The church of La Nunziata dei Catalani is next oldest, it is mentioned as existing in 1169; La Madonna della Scala, rebuilt 1296-1336; and S. Francesco 1254. GUARINI designed 1648 the church of S. Filippo Neri, and 1660 that called La Nuntiatia; S. Gulli that of S. Michele in the Strada de' Monasteri; the church of Monte Vergine, is by G. and N. F. MAFFEI, who completed 1605 the spedale della Pietà; La Maddalena 1765 by C. Marchione; and the Jesuits' college by N. Masuccio. The royal palace in the environs, designed by Juvara 1713-20 for Vittorio Amadeo II; the archiepiscopal palace; the *palazzo pubblico*, rebuilt 1807-9 by G. Minutoli, A. Arense, and A. Tardi; the senate house; the grand seminary; the college; the large hospital; numerous monastic institutions; the two theatres; the lazaretto, given in HOWARD, *Account*, etc., 4to., London, 1791; the arsenals; a royal college or *Real academia Carolina*; and the granaries, are all worthy of notice.

SAMPIERI, *Messana Illustrata*, 4to., Messina, 1742; AUGUSTI, *Dei terremoti di Mess.*, 8vo., Bolog., 1733; SAINT NON, *Voyage Pitt.*, fol., Paris, 1781-6, iv, 14; HOUËL, *Voy. Pitt. de la Sicile*, etc., 4 vols. fol., Paris, 1782-87; GOLDCUTT, *Antiq. of Sicily*, fol., Lond., 1819, pl. 37, gives a view from the heights; WELZ, *Saggio...le ricchezze delle Scicilia*, 4to., Paris, 1822; FRANKLAND, *Travels*, 2 vols. 8vo., Lond., 1829, ii, 219; HUGHES, *Travels in Sicily*, 8vo., Lond., 1830, i, p. 109;

Nuova Guida...in Italia, Milan, 1830; GALLY KNIGHT, *Normans in Sicily*, 12mo., Lond., 1833, pp. 116, and 204, pl. 6-7; SMYTH, *Sicily*. CUCINIELLO and BIANCHI, *Viaggio*, fol., Naples, n. d. 14. 28. 50.

MESSLE or MESELE HOUSE. Supposed to be derived from *measle* (obsolete), a person afflicted with leprosy; and therefore applied to an hospital or lazaret house. LANGTOFT, *Chronicle*, edit. by HEARNE, 8vo., Lond., 1725, in Glossary. 19.

MESSUA FERREA. A tree of India, supplies IRON WOOD.

MESSUAGE. In a legal deed this word is synonymous with dwelling-house, and the grant of a messuage with the appurtenances will not only pass a house, but all buildings attached or adjoining to it; as also its curtilage, garden, and orchard, together with the close in which the house is built. But if a greater quantity of land has been usually occupied with the house it will not pass; CRUISE, *Digest*, 8vo., Lond., 1835, iv, 26; who, vi, 175, states that the devise of a messuage will carry with it the curtilage and garden annexed to such messuage, even without the word appurtenances; for they constitute a part of the messuage. It was formerly held that the word "house" did not in a will carry the garden or curtilage belonging to such house without the word appurtenances. This doctrine is now somewhat altered.

In *Scholes v. Hargreaves*, 5 Terms, R. 46, Mr. Justice Bullen said the only question was what was meant in former cases by the words "messuage and cottage annexed to which was the right of common claimed." And that it was necessary there should be some land annexed to the house was clear from considering what was meant by "levancy and couchancy", namely, possession of such land as would keep the cattle claimed to be commoned, during the winter; and as many as could be so kept, so many should be said to be "levant and couchant", WOODFALL, *Landlord and Tenant*, 8vo., Lond., 1849, i, chap. 4, p. 65. R. E. P.

MESTIVIER or MÉTIVIER (ANTOINE), may have succeeded to Jacques Androuet, who died 17 Sept. 1614, as contrôleur et architecte des bâtiments du roi Louis XIII. He was succeeded 30 Sept. 1617, soon after his death, by Jean Androuet du Cerceau. BERTY, *Les grands Arch. Franç.*, 8vo., Paris, 1860, p. 111.

MESTLING or Mastline, yellow metal, brass, or LATTEN. Sacred utensils and ornaments were made of it, as noticed in an Inventory 1541, taken at Wolverhampton; SHAW, *Staffords.*, fol., Lond., 1801, ii, 160.

MET. An ancient measure of quantity. "12 mets of sand" are recorded 1399; see MASON, tools of, p. 46; and a chaldron of lime appear to have been divided into "16 metts" about 1660, at Great Yarmouth. It may probably be the short for *metreta*, as found in the record "cum j metreta pro calce", in SURTEES SOCIETY, *Fabrick Rolls of York cathedral*, 8vo., Durham, 1859.

META. The Latin name for the obelisks placed at each end of the Roman circus to mark the turning points. GOAL, wherein a woodcut is given.

METAGENES, of Cnossus in Crete, commenced with his father Ctesiphon, the first temple (or supposed last temple but two) of Diana at EPHEBUS; or completed it; or only erected the columns and entablature of the second temple, about B.C. 560. The article CTESIPHON; and SILLIO, *Artists of Antiquity*, 8vo., Lond., 1836, explain the difficulties attending the dates of these architects: PLINY, in error, attributes the third (or last) temple to them. DEINOCRATES. 25. 29.

METAGENES, belonging to the district Xypeta at Athens, where he was born, about B.C. 450, succeeded Corcebus (who had erected the lower columns and their epistylia) in the construction of the temple of initiation (τελεστήριον) at Eleusis, and added the galleries and the upper order of columns. Xenocles, the Chalcargian, constructed the roof over the ceiling of the sanctuary. PLUTARCH in *v. Pericles*. STRABO and VITRUVIUS assign the temple in question to Ictinus. SOCIETY

OF DILETTANTI, *Unedited Antig.*, fol., London, 1833, 2nd edit., p. 27, and plate by J. P. Gandy. 25.

METAL. A firm, heavy, and hard substance, opaque, fusible by fire and again concreting when cold into a solid body such as it was before; generally malleable under the hammer, and of bright, glossy, and glittering substance where newly cut or broken. The metals conduct electricity and heat, and have not been resolved into other forms of matter, so that they are regarded as simple or elementary substances. Numerous metals are now recognised, but only seven were known to the ancients; namely Gold, whose symbol is thus marked ☉; Silver, ♀; Mercury, ☿; Iron, ♂; Copper, ♀; Lead, ♀; and Tin, ♀. These, with Zinc, will be further noticed in this work as those mostly used in building and for ornamental purposes. WOOD, *Notes on the Metals*, for the Lecture Room, 8vo., Lond., 1868, two series. FRASER'S MAGAZINE, *New Metals*, December 1855. BLYTH, *Metallography*, 8vo., Lond., 1871.

1. 14. 23.

Metals may be coated, or bronzed, or electroplated, united and some welded (FRACTURE; WELDING); corroded (DECOMPOSITION, ATMOSPHERIC INFLUENCE, RUST, OXIDATION); inlaid; and alloyed (s. v. Bell-metal, Brass, Bronze, Gun-metal, Latten, Solder, Pewter, Dutch metal); GUETTIER, *Practical Guide* for the manufacture of Metallic alloys, comprising their chemical and physical properties, with their preparation, composition, and uses; translated from the French (12mo., Paris, 1865) by FESQUET, 8vo. See also RESISTANCE, STRENGTH, and WEIGHT, OF MATERIALS. *Employment of Metals in Building*, in DALY, *Revue Générale*, 4to., Paris, 1858, xvi, 162, 212.

METAL. A word applied by workmen to broken glass; and also to broken stones for repairing roads.

METALLIC CANVAS. The patent metallic canvas of Messrs. Johnson and Sons is a combination of metal and canvas of various substances and strengths according to the purposes to which it is to be applied. The metal is Wetterstedt's patent metal, by which, combined with canvas, lightness and security are obtained, sufficient strength being given to metal weighing only 8 oz. per foot, to enable it to be used as a perfectly waterproof covering. It will effectually keep back damp in walls; the cement with which the combination is effected is elastic, impervious to damp, and a disinfectant.

Messrs. Elkington patented a metallic cloth formed by a surface of copper, to which stout linen, cotton, or woollen cloth was attached; this, being immersed in a solution of copper or other metal, and properly connected with a galvanic battery, the decomposed metal endeavoured to reach the plate, and insinuated itself into all the pores of the cloth, forming a perfect sheet of metal, of which a surface of nine square feet weighed only about 18 oz. CIVIL ENGINEER, etc., *Journal*, 1844, vii, 76.

METALLIC CEMENT. Dyer's patent metallic sand cement was brought out about 1835. The sand is produced by grinding copper slag; in chemical analysis it is very similar to pozzuolano; the cement used with it is blue lias lime. SOCIETY OF ARTS *Transactions*, vol. IV, 85; *BUILDER Journal*, 1843, i, 533; iii, 160; CIVIL ENGINEER, etc., *Journal*, 1843, vi, 467. Samples were shown in the Exhibition of the Industry of All Nations, 1851. A mixture of blue lias lime with a kind of metallic sand resembling pozzuolano, but containing iron, forms Benson's metallic cement. This was used at the Houses of Parliament, at the London Bridge station, Alfred Life insurance office, and at other large buildings, both as concrete and as a stucco for covering surfaces; *BUILDING NEWS Journal*, 1856, ii, 538.

METALLIC LAVA. A patent was taken out 1848 by J. Orsi, for a composition of gravel or small stone 3 parts; pounded chalk 2 parts; tar 1 part; and wax, one-tenth. This artificial stone, or metallic lava, was cast in mounds, into solid blocks, hollow vessels, and pipes. Also for ornamental tiles, bricks, and quarries, a combination of ground flint 2 parts; marble 1 part; wax one-tenth; and some mineral colour two-

tenths parts. Also for cement from either combination in a comminuted state, and used while warm. This was later known as Orsi and Armani's metallic lava. It appeared to have many advantages, especially in places where the surface of other floorings would be made moist and mouldy by rising damp. The vestibule of the great hall at the Euston Square railway station was paved with it. It admitted of the exercise of taste in design on the part of the architect. *BUILDER Journal*, 1848-9, vi, 502; vii, 93, 430. The material was said to shrink very greatly.

METALLIC PROTOXIDE PAINT, Todd's patent, was found (in 1854) to be "after the most severe trials, peculiarly efficacious in preserving iron from oxidation, wood from decay, and masonry, brickwork, and stucco work, from dampness. Applied to iron, it united with it most intimately, forming a complete coating: so that thus protected, it was found equal to the best galvanised iron. It adhered firmly to iron, even at a red heat. *BUILDER Journal*, 1854, xx, in ads. for July, etc.

WADE'S METALLIC OIL PAINT, for internal decoration of houses, and of the ANTICORROSION PAINT for all work exposed to the weather, 12mo. Lond., 1818; is the title of a pamphlet, a copy of which is in Sir John Soane's Museum.

METALLING, BALLASTING, or BOTTOMING. A term applied to the covering of roads generally; also to the material laid on the natural soil for forming the substratum for the finished roadway; it is thus used for the purpose of keeping the surface dry by draining off the water. Ballasting is mostly composed of large gravel, broken stone, cinders, brick rubbish, or any other substance that is pervious and slightly elastic, and is generally laid from 6 to 12 ins. thick on roads; and about 2 ft. thick on railways. Water does not run so easily through fine sand; sand containing a large portion of clay absorbs the water, and becomes converted into mud after heavy rains; but a small portion of clay gives the ballasting a certain degree of consistency which prevents its being displaced. Stones that are liable to be pulverised by frost should not be used. Faggots are often used on boggy ground for bottoming. Occasionally a small drain about 6 ins. diam. is laid in the roadways, having cross drains into side ditches, or other means of conveying away the water. BRES, *Glossary*.

Burnt clay is now greatly used as ballast to receive the metalling for forming the surface of the roadway. Its manufacture is detailed in the *ILLUSTRATED BUILDERS' JOURNAL*, 4to., Lond., 1865, p. 2; and in GWILT, *Encyc. of Arch.*, 8vo., Lond., 1867, p. 550, edit. by PAPWORTH. The clay should be weathered in heaps before being burnt, and be well burnt, or it soon becomes mere mud, especially if traffic be allowed to pass over it before it is covered.

FORSYTH, *Beauties of Scotland*, 8vo., Edinb., 1805-8, iv, 8, gives a table showing the number of times that a cart (of the size he describes, containing ten cubic feet of metal) can go and return from the pits of gravel or quarries of stone, according to the several distances, which is found from experience to be tolerably exact; as well as the number of lineal yards (the breadth of roadway being 16 ft., 1 ft. deep in centre and 9 ins. at sides) covered in a day: thus $\frac{1}{4}$ mile distance; 36 times go and return in a day; 12 yds. lin. covered by a cart in a day; —and so on down to $2\frac{1}{2}$ miles distance.

METALLURGY. The art of working metals, or separating them from their ores: the process varies for each metal. PERCY, *Met. of iron and steel*, 8vo., Lond., 1864; new edition 1874-5. OVERMAN, *Treatise on M.*, comprising mining in general, 8vo., New York, 1852. IRON.

METAL WORK (Fr. *ferrure*). The employment of metals in ornamental and decorative purposes. WYATT, *Metal work and its artistic design*, fol., Lond., 1852. This subject, as regards iron, has been treated in detail herein, s. v. IRON WORK; and in addition to the publications named therein may be added: HEFNER, *Serrurerie, ou les ouvrages en fer forgé du Moyen Age et de la Renaissance*, text by RAMÉE, 84 pl., fol.,

METAL WORK

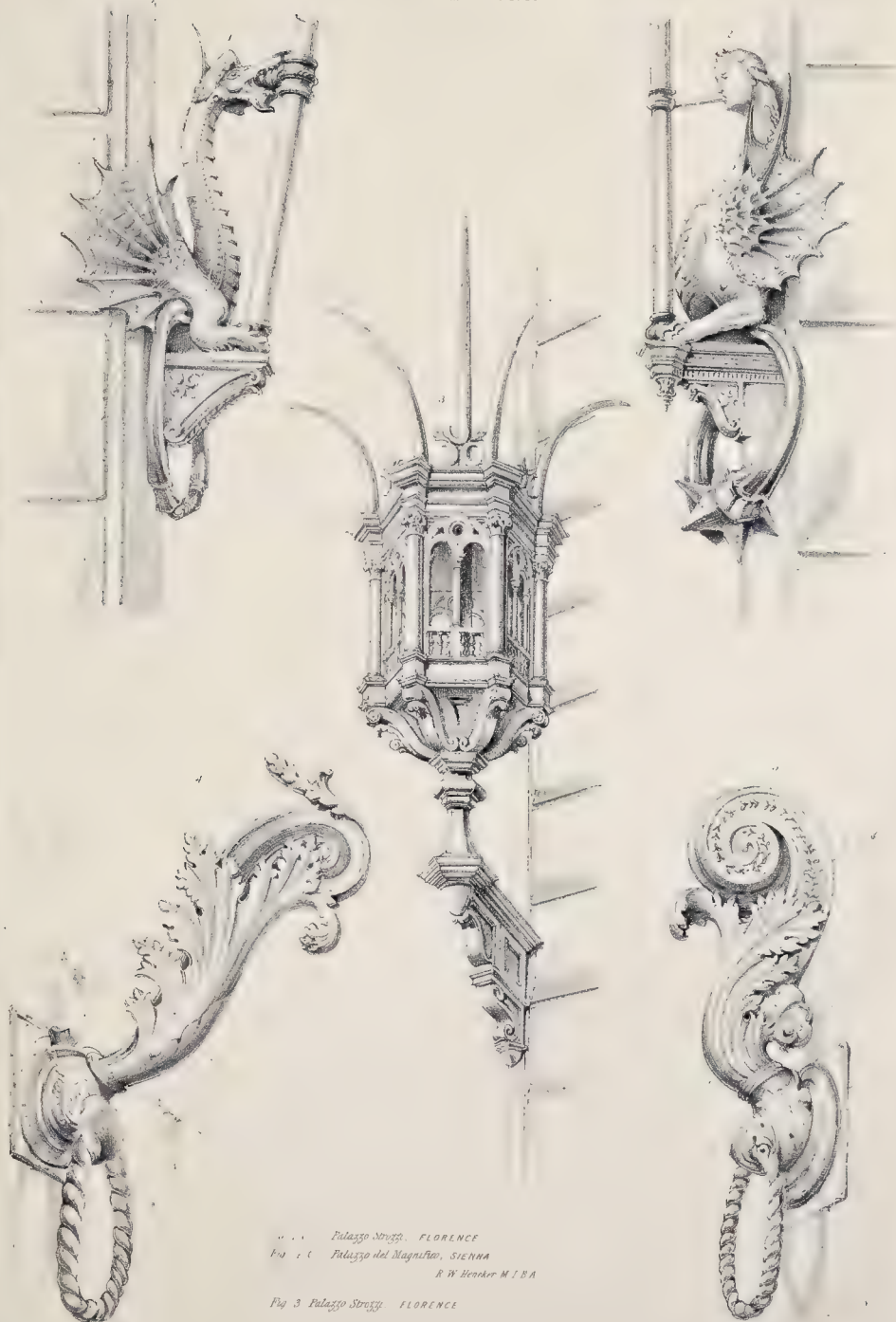
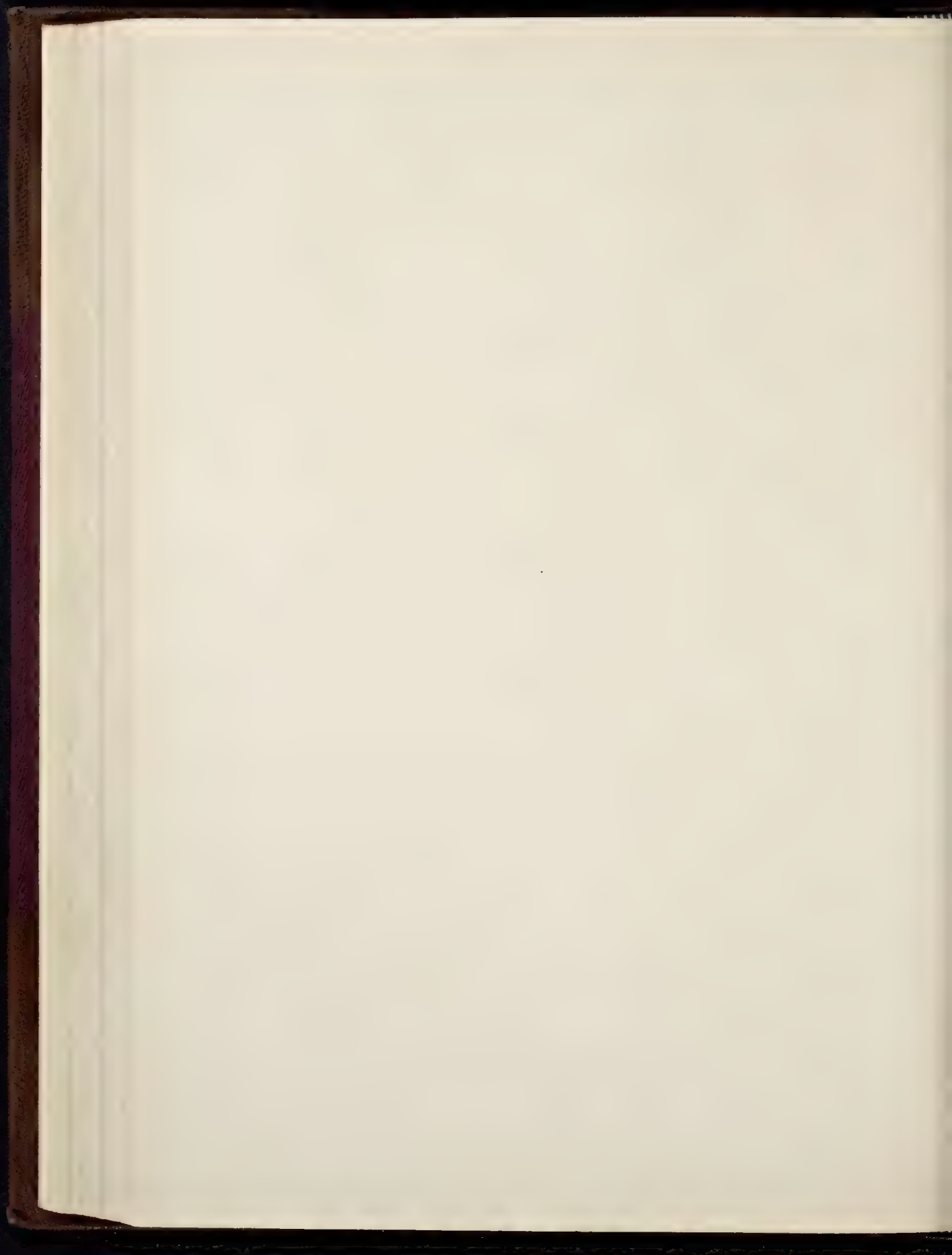


Fig. 1. Palazzo Strozzi, FLORENCE
 Fig. 2. Palazzo del Magnifico, SIENNA
 R. W. BROWNE M. I. D. A.
 Fig. 3. Palazzo Strozzi, FLORENCE
 M. J. A. J. D. A.



METAL WORK



Fig. 1.

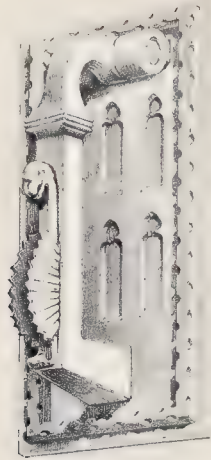


Fig. 2.



Fig. 3.



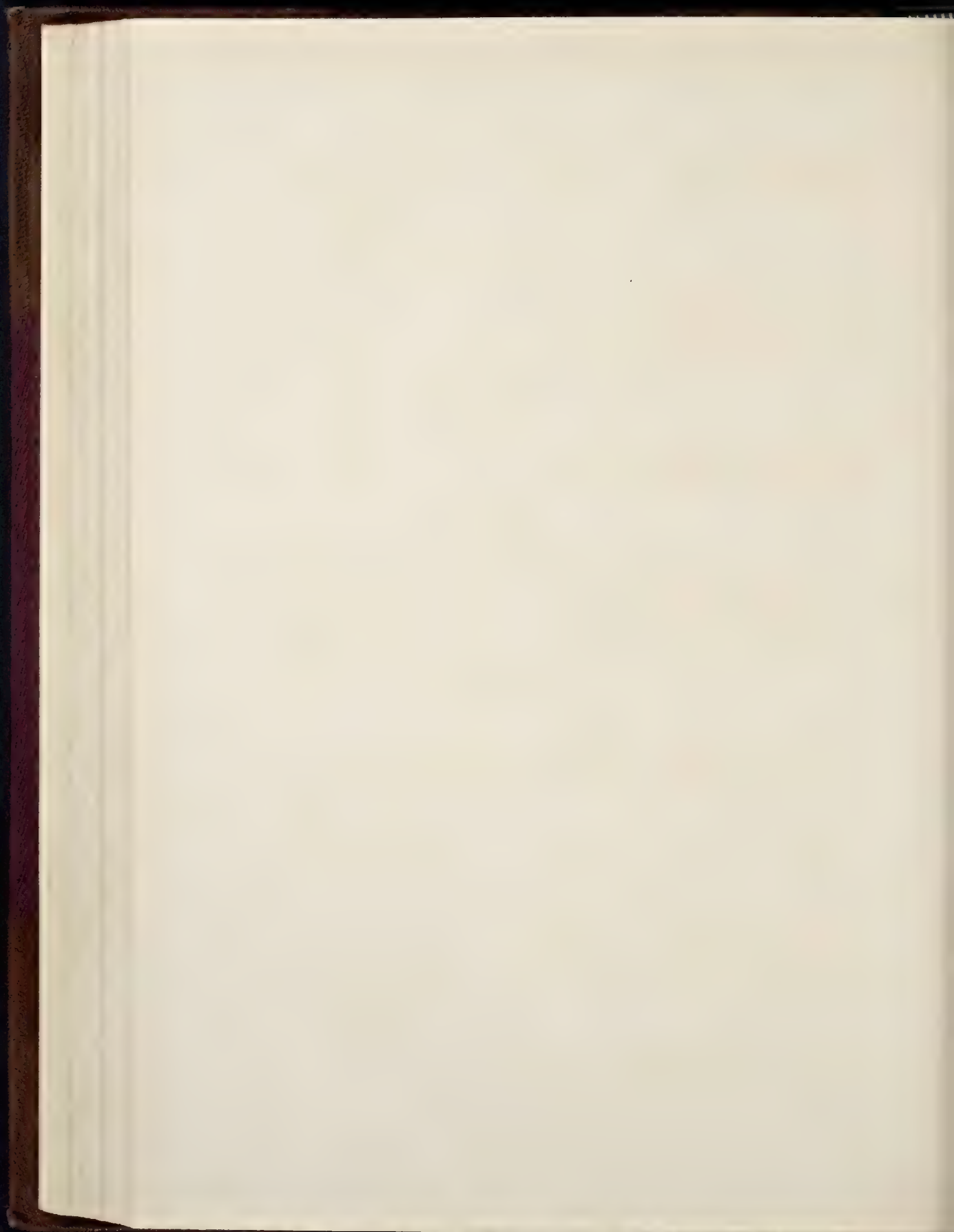
CATHEDRAL, BERN.
TOP OF TOWER



Fig. 4.

James Bell M.I.B.A.

London: Architectural Publication Society, 1881.



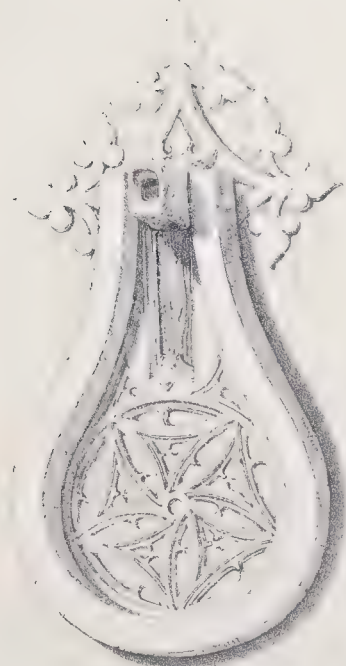
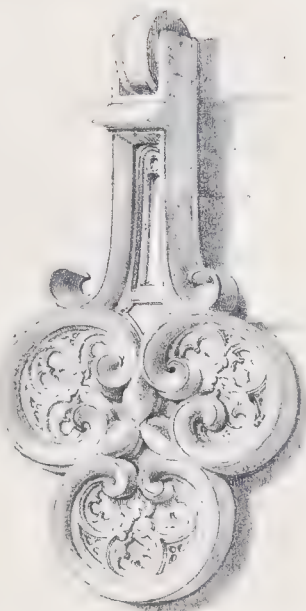




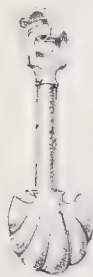
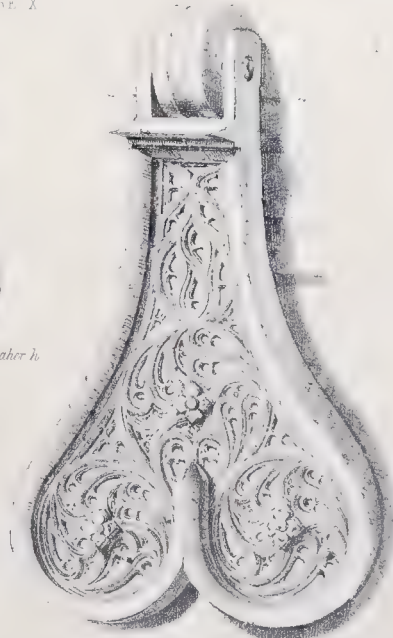
METAL WORK



Cath. Evreux



Chapel in Cath. EVREUX

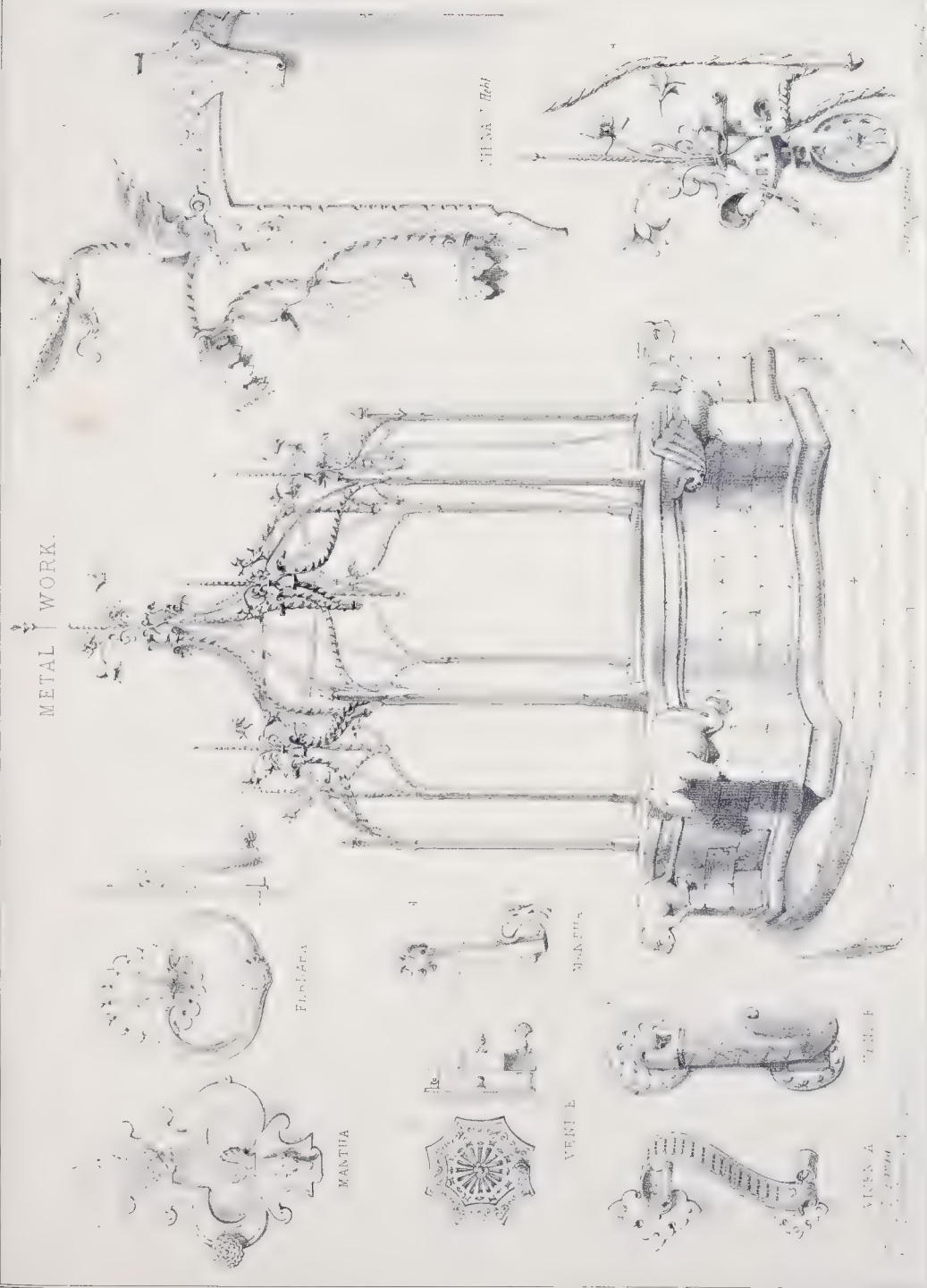
From Cabinet of M. Delaher in
BEAUVAIS

Chapel in Cath. EVREUX

W. Purges M. B. A.



METAL WORK.





METAL WORK



BETHWORTH Church.



BETHWORTH Church.



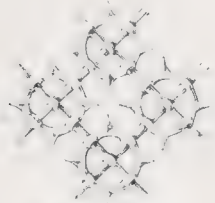
BETHWORTH Church.



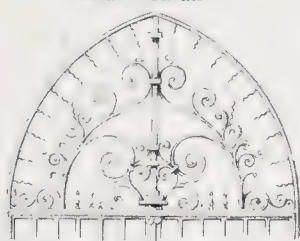
BETHWORTH Church.



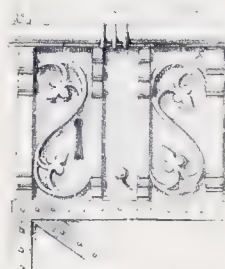
BETHWORTH Church.



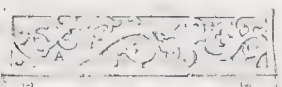
BETHWORTH Church.



BETHWORTH Church.



BETHWORTH Church.



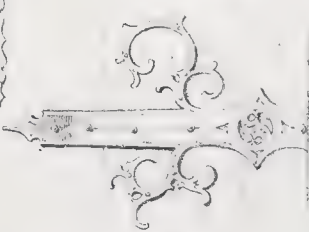
BETHWORTH Church.



BETHWORTH Church.



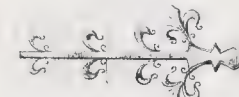
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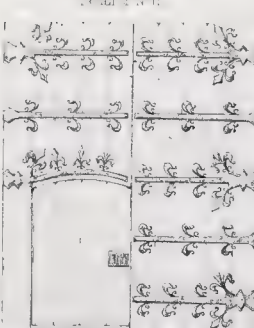
BETHWORTH Church.



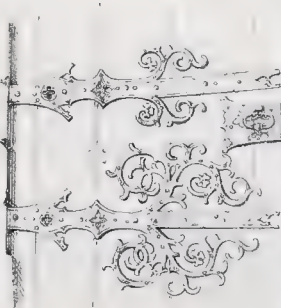
BETHWORTH Church.



BETHWORTH Church.



BETHWORTH Church.



BETHWORTH Church.



METAL WORK



EAST BRENT Church



COTTINGHAM Church, Yorkshire



HAKROW Church, Middlesex



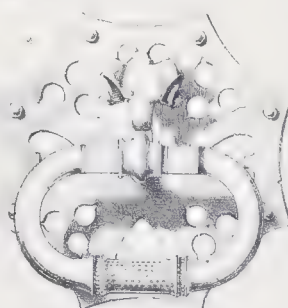
HESSET, Church Suffolk



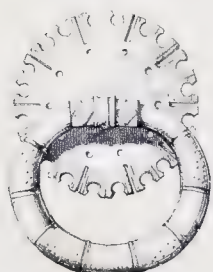
CORSHAM COURT, Wilt



SIENNA Palazzo del Governo



CHRISTCHURCH N^o Newport Monmouth



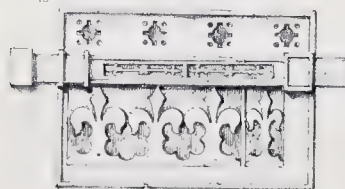
CIRENCESTER Church



PORTISHFAD Somerset



CLIVELON Old Church Somerset



Lock from a Church N^o ROME

113 74 75 16 & 17 T.S. Page
234 & 5 George Truett M.B.A. 6 Olausson Leonard M.B.A.



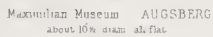
COLOGNE



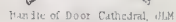
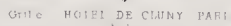
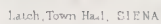
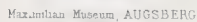
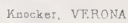
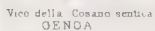
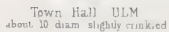
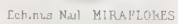
COLOGNE Towel Rack

R.F. Cockerell M.B.A. 8 J. Valdes M.B.A.
30 & 11 J.F. Sadler M.B.A. 12 J. Drayton M.B.A.





Handle of Loor
MIRAFLORES





Paris, 1869. SANGUINETTI, *La Serrurerie au xix siècle*, 120 pl., 4to., Paris, n. d.; also his *La Serrurerie Parisienne*, 27 pl., 4to. VIOLLET LE DUC, *Dictionnaire, s. v. Serrurerie*. A short history by SKIDMORE in *BUILDER Journal*, 1855, xiii, 551, 575; and 1863, xxi, 362-4. DALY, *Revue Générale*, 4to., Paris, 1857, xv, pl. 20-1-3; xvii, 1859, pl. 53. AITKEN, *Ancient and Modern Metal working and ornamentation*, 1854; and in *SOCIETY OF ARTS Journal*; and *CIVIL ENGINEER*, etc., *Journal*, xvii, 138-145. *Illustrations in Detached Essays*, pl. 20, 47, 63, Hipknot, Furniture, and Ridge; also 1850-51; 1859; 1861; and Grille 1858-59.

METAPONTUM. It was formerly an important city of Magna Græcia, on the gulf of Tarentum in Southern Italy. The ruins are situated near Torre di Mare. It may have been founded about 700-600 B.C. The site and remains were carefully examined in 1828 by the duke de LYNES, *Métaponte*, fol., Paris, 1833, which publication gives representations of the coloured terra cotta work: there is a temple known as the *tabola dei Paladini*, of which fifteen Doric columns are standing, supposed to be of later date than those at Pæstum; some heaped ruins of another temple, called *chiesa di Sansone*, and supposed to mark the site of the city. They were measured by the architect Debacq. DALY, *Revue Générale*, 1858, xvi, 52. SAINT NON, *Voy. Pitt. de Naples*, fol., Paris, 1781-6, iii, 77. AURÈS, *Etudes des ruines de Met., au double point de vue de l'arch. et de la métrologie*, 4to., Paris, 1865. The granite Corinthian columns in the cathedral at Matera are said to have been taken from these ruins.

The *torre di Mare*, now the only inhabited spot on the plain, derives its name from a castellated edifice of the middle ages, and is now one and a half miles from the sea.

23. METATONIUM, Mesalorium, Mitalorum, or Mutalarium, in ancient churches; see ASPASTICUM, and DIACONICUM.

METATOME is supposed to be the correct reading in VITRUVIUS, iii, chap. 3, for METOCHE, supposed to mean the space or interval between two dentils.

1. MÉTEZAU, according to JAL, *Dict. Crit.*, 8vo., Paris, 1867. or MÉTEZEAU, as usually written, and MÉTEZEAU. The family name of several architects, of whom little was known to D'ARGENVILLE and his copyists. The following notice is taken from BERTY, *Les grands Architectes*, 8vo., Paris, 1859, pp. 120-134: who states that CLÉMENT MÉTEZEAU, master mason at Dreux, in 1516, with Jean des Moulins, undertook to continue the building of the hotel de ville commenced 1512 by Pierre Carrou; that he died between 1537 and 1556, and was one of the presumed authors, if not the sole designer, of the rich *portail* of the parish church in that town. One of his sons, JEAN MÉTEZEAU, "architecteur", and also "maître de la conduite de son état" for the church of S. Pierre at Dreux, was buried 27 April 1600 in that town. Another son of Clément was THIBAUT, also called THÉOBALD MÉTEZEAU, born 21 October 1533, left Dreux about 1569, and settled at Paris, where, according to BRICE, *Nouv. Descr.*, 12mo., Paris, 1725, iv, 160, he was one of the contractors for the erection of the pont-neuf, commenced 1578; and tendered for works to the Valois tomb 14 March 1582. He appears, however, in the list for 1576 of the "gens de mestier" of the duke of Alençon as architect; and 1578 he is found with the title of "architecte du roi" to Henry III. According to SAUVAT, *Histoire*, fol., Paris, 1724, iii, 1, he erected the *avant-portail* of the porte S. Antoine, which bore the date 1585; BERTY, 123, adds that it was remodelled 1671 by F. Blondel, who added the door on each side (BLONDEL, *Cours*, 8vo., Paris, 1771, vi, 468, 499); it was destroyed 1778 according to LA THYNNÉ; or between 1777 and 1792, as stated s. v. Blondel; and ii, 42, commenced the *salle des antiques* at the Louvre; to which BERTY adds an opinion that he was the real projector of the great gallery; and that if any Métezau worked with, or under De l'Orme, it was this Thibaut, and not his son Louis. He died before September 1596. DIDOT, and also MICHAUD, state he died 1599.

*J. W. P.

ARCH. PUB. SOC.

MÉTEZEAU (Louis) is accepted, on the evidence he gives, by BERTY as the eldest son of Thibaut; but QUATREMÈRE DE QUINCY, *Dict.*, considers his father was Clément de Dreux. In 1596 he occurs as "architecte du roi" (Henry IV, 1589-1610) and "contrôleur des bâtiments royaux"; and was commissioned to make arrangements with the engineer Alessandro Francini for the entrance of the queen into Paris in March and April 1610. BRICE, i, 163, 180, says, erroneously, that he made the dyke at Rochelle, but, perhaps correctly, i, 157, that he directed for Louis XIII (1610-43) the construction of the first half of the great gallery of the Louvre (i.e., from the old Louvre to the third wicket), which is attributed by VIRLOYS, and by DE QUINCY to Clément; and so by BLONDEL, *Arch. Franç.*, iv, 87, and plate; BRICE, 1725, i, 157. He is sometimes called "capitaine des Tuileries" from 1564, and in 1609 he signs as "consierge et garde des meubles du palais des Thuilleries"; he became "écuyer"; and in 1615 is known to have been named "sieur de Germainville et de Bressac (or Brisac) près Dreux, architecte et ordonnateur des bastimens du roy", with also the above title. The idea that he worked with, or under De l'Orme, and, indeed, was the author of the celebrated staircase at the Tuileries, is repudiated as to Louis, but not altogether as to THIBAUT, by BERTY, who also considers that a journey to Italy 1611, and a design for the Luxembourg, belong less to Louis than to the Clément noticed in the following article. He is said to have died shortly before 10 Sept. 1615; JAL, *Dict. Crit.*, 8vo., Paris, 1867, shows a son Charles baptised 17 July in that year. DIDOT gives his dates 1559-1615.

*J. W. P.

It is possible that GUILLAUME Métezau, "ingénieur ordinaire" to Louis XIV in 1667, was his son.

MÉTEZEAU (CLÉMENT), is considered by BERTY (1859) to have been born 6 February 1581, and to have been the youngest son of Thibaut. JAL (1867) thinks it probable that he was the son of Loys de Méthésau (*sic*), who was married 28 Aug. 1598, at S. Merry (a second wife?), and also brother of Louis. CLARAC, *Descr. du Musée Royal*, 8vo., Paris, 1830, i, 359-60, calls him the son of Louis. VIRLOYS, *Dict.*, who knew of no other Métezau, ascribes to Clément the creation of the great gallery of the Louvre, though a design more probably due to Louis, as above stated.

BERTY supposes that to him, and not to Louis, apply the stories of having been sent into Italy by Marie de Médicis, and of having made plans for the Luxembourg; and adds that, if there be any doubt about the journey, there can be none about the plans which, according to D'ARGENVILLE, i, 321, were considered by competent judges to be quite as good as those by S. de Brosse, whose designs were preferred. Moreover, Berty believes that there may have been some foundation for the ascription to Clément of Brosse's *portail* 1616 to the church of SS. Gervais et Protas, which CATHERINOT, *Traité de l'Arch.*, Paris, 1688, pp. 17-18, intimates was designed by them jointly. The first stone of his church of the pères de l'Oratoire in the rue S. Honoré at Paris, was laid 22 Sept. 1621; DE QUINCY says 1612, and BLONDEL, *Arch. Franç.*, fol., Paris, 1752-56, iii, 55, and plates, states 1616; (also given in the *petit MAROT*); the choir was completed 1630 by Le Mercier, on the original plan (except the *portail*, a subsequent work by Caqué; LEGRAND and LANDON, *Descr.*, 8vo., Paris, 1808, i, 201). Soon after 1622 he built in the rue S. Thomas du Louvre (on the site of the present rue du Carrousel) for Charles de la Vieuville, the hôtel afterwards known as de Chevreuse, d'Epéron, and lastly, de Longueville. BRICE, i, 180, appears to ascribe this work to Louis; it was pulled down 1833, as shown in SOUVENIRS DE PARIS, fol., Paris, 1836, p. 67; and is engraved in the *Grand MAROT*, 1717, pl. 14, with the original design for the façade; and in the *Petit MAROT*, 1760.

He was "architecte du roi" in 1623 or 1624, and received 2,400 livres yearly from the king Louis XIII, who also paid 300 livres yearly for the maintenance and instruction of his apprentice Claude Rouhier. He arrived 27 Nov. 1627 at

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Rochelle, with the master mason Jean Tiriot or Tirieau, and, being admitted to the council of war, proposed the dyke, which was begun next day, or 2 Dec., and found to be so easy as to allow of the task being confided to Monsieur de Marillac, whereon Métézeau and Tiriot went back, each receiving a thousand crowns. If Clément did not obtain a pension of 1800 livres and a lodging at the Louvre, he at least got immense celebrity from that dyke (INGENIATOR); and his portrait was engraved by Michel Lasne, with a long inscription, "Clément Métézeau, Druide, architecte ingénieur du roy, inventeur de la digue", etc., etc. CLARAC, 357-9, ascribes to him the profiled, but not moulded, vases of the pilasters under the porticos of the Tuileries, at the hôtel de Longueville, and at the petite galerie of the Louvre; BLONDEL, *Cours*, ii, 175, adds the château neuf de S. Germain en Laye. BLONDEL, *A. F.*, iii, 55, states he erected many edifices in a semi-Gothic style. According to D'ARNOVILLE he designed the château de la Meilleraye in Poitou; and for the marshal d'Effiat the château de Chilly, on the road to Orleans. By direction of cardinal Mazarin, he endeavoured to destroy the great donjon at Coucy by gunpowder; VIOLET LE DUC, *Dict.*, s. v. He seems to have retired to Dreux, where he is held to have built the southern transept (*croisillon*) of the church of S. Pierre; the records of the nunnery of the Assumption show that the cloister was begun in August 1632, from his design. He was alive 1650; "died in 1652", states JAL, who could not give his age; but he was certainly dead January 1653; and was buried in the nave of S. Paul's church at Dreux, near his parents. *J. W. P. 5. 25. 34.

METHANA in Argolis. Of this ancient Greek city, a gateway of the acropolis is given in DODWELL, *Cyclopean Remains*, fol., Lond., 1834. 78.

METICUS or METICHUS, of uncertain date, formed an agora or market place at Athens, which bore his name, as did also an edifice built by him in which the tribunal was held. JULIUS POLLUX, viii, 10, 121. SILLIG, *Artists of Antiq.*, 8vo., Lond., 1836. 29.

METOCHE. A term used by VITRUVIUS, iii, chap. 3, to denote the interval or space between the dentils of the Ionic, or the triglyphs of the Doric, Order. BALDUS observes that in an old MS. of that author, the word "metatome" is used instead of metoche; D'AVILER therefore considered the word metatome to be correct. INTERDENTIL. 25.

METIVIER (JEAN), was a native of France, but practised at Munich, in which city he was induced to settle by the duke of Leuchtenberg, and where 1826 he completed the synagogue; designed the residence of madame Bayersdorf, one of the best of the new houses in that city; a mansion in Pranner Strasse for prince Charles; besides many other edifices and their decorations, from 1812 until his death, before or in 1859. The original sketches, drawings and tracings, containing upwards of 500 of his designs, bound in two volumes 4to., were for sale Dec. 1860 in London. RACZYNSKI, *Hist. de l'Art, etc.*, 4to., Paris, 1836, ii, 439.

METOPA and METOPE. The square space between the triglyphs in the frieze of the Doric Order of Greek, Roman, and Italian architecture. The term is probably derived from *μετα* between, and *οπη* a hole; the "hole" being the space in which the end of the main beam represented by the triglyphs was placed. VITRUVIUS, iv, 2, is the only authority for this application of the term; the words in a preceding paragraph "et oparam" have been needlessly altered by some editors into "intertignium". The edit. by CESARE CESARIANO, fol., Como, 1521, p. 63b, but wrongly marked 48b, should be read. At an early period in the art these spaces were left open in imitation of timber structures, the triglyphs representing the ends of beams; thus EURIPIDES (B.C. 480-406) in *Iphigenia in Taurid.*, 116, makes Pylades advise Orestes to slip through one of the open spaces between the triglyphs in order to gain access into the temple; SOCIETY OF DILETTANTI, *Unedited Antiq.*, fol., London, 1833, p. 38, describing the temple to

Diana Propylea at Eleusis. In after times these intervals were filled in with slabs, and then adorned with sculpture. 25.

In NICHOLSON, *Encyclopædia of Arch.*, 1852-4, the size of various metopes is tabulated from STUART and REVERT, *Antiq. of Athens*, from which it appears that the width of the metope was always greater than the height. NORMAND, *Nouveau Parallèle*, fol., Paris, 1819; and MAUCH, *Neus system. darst.*, 3rd edit., 4to., Potsdam, 1845, give ancient and modern examples. VITRUVIUS, iv, 3, however, states that the metope should be square; a half metope at the end of the frieze is prescribed by him, caused by placing the triglyph over the centre of the column: a space will be found in the Arch of Diocletian, and in many of the modern examples, otherwise the triglyph finishes the frieze; and at Bassæ its length next the angles was extended one sixty-eighth of its usual size; as well as at the Parthenon, where it is about 6 ins. longer than the others (Fr. *metope barlongée*).

VITRUVIUS, iv, 2, applies the term metope to the space between the dentils; INTERDENTIL; METOCHE; METATOME.

Among the early examples of sculptured metopes, are those (dating about 600 B.C.) discovered at Selinus in 1823 by ANGELL and EVANS, who published *Sculptured Metopes*, fol., London, 1826; and PISANI, *Memoria sulle Metope Selinunte*, 8vo., Palermo, 1823. Those of the Parthenon, and of the temple of Theseus at Athens, some of the former comprised in the Elgin collection now in the British Museum, are among the best known examples. Those of the Parthenon were ninety-two in number, and contained, in high relief, the actions of Minerva, the wars with the Centaurs and Lapithæ, and other subjects. The temple was completed B.C. 438. The distance, about 40 feet from the eye when in position, rendered great relief necessary in the sculpture; some parts are therefore entirely detached from the ground. HITTOFF very ingeniously suggests that many of the square groups on the Greek vases were mere repetitions of subjects in the metopes of the Doric temples.

Besides figures, other decorations have been introduced in the metope; thus a lyre, tripod, and griffin, are seen on the temple to Apollo at Delos. In the works of the moderns a bull's skull (BUCRANIUM), in imitation of that on the temple to Jupiter Tonans (now known as the temple to Vespasian) at the foot of the Capitol at Rome, is often seen alternating with pateras. Many other devices symbolic or characteristic, such as garlands, branches of palm or laurel, utensils of sacrifice, the dove and lamb, etc., have been adopted in later architecture. CHAMBERS, *Civil Architecture*, fol., London, 1759, 1st edit., remarks that: "Too much variety in the ornaments of the metopes must be avoided, lest the unity of the composition should be destroyed. It is best never to introduce more than two different representations; which should not consist of above one, or at most two objects each, of simple forms, and not overcharged with ornaments." The work should not project too much, not only on account of the liability to suffer by action of the weather, but because if in very "great relief they become more striking than the triglyphs, which being essential and principal parts of the composition ought to predominate." Palladio, in his basilica at Vicenza, has given to the most elevated parts of the ox-skulls and pateras with which the metopes are filled, very little more projection than that of the triglyph; and in this he has copied the ancients, who seldom or never gave more projection to any ornament than that of the frame or border in which it was enclosed. R. E. P.

METRAHENEH or MITRANIEH, see MEMPHIS, in Egypt. METRANO (GIOR.), designed 1735 the theatre of S. Carlo at Naples, which was burnt 1816, and restored in the following year by Ant. Niccolini. 14.

METRE. The name of the unit of lineal measure adopted by the French nation, and from which their other measures are derived. The Assemblée Constituante, 8 May 1790, took up the question of an uniform system; and the ten-millionth part of

the arc of the meridian comprised between the equator and the North Pole (or the ten-millionth part of the fourth of the terrestrial meridian, as it is sometimes put), was selected as the unit. The law of France 19th Frimaire, ann. viii (11 Dec. 1799), declares the mètre to contain 443,296 lines ancient measure. PRONY, after a long course of pyrometric measurements and comparisons made in the latter end of 1815, found the mètre to contain 39·3799205 English inches. Hence the ancient foot or *piéd du roi* equals 0·32484 mètre and 1·066012431 Engl. ft.; and the usual foot 1·09388668 Engl. ft. The ancient *toise* equals 1·94903631 mètres; and 2·13202486 Engl. yards, or about 2 yards 4½ ins. The mètre has since been proved by captain Henry Kater to be equal to 39·37079 Engl. ins., or 3·280916 Engl. ft., formerly called 3·2808992 (GWILT, *Encycl.*). Note. 3·2809 has been the measure used throughout this work when reducing French dimensions.

The metric system up to 1863 was in use in France, Holland, Belgium, Italy, Spain, Portugal, Switzerland, Greece, and several countries of South America; Austria adopted it optionally from January 1873, and exclusively from January 1876. The Act of 27 and 28 Vict., c. 117, passed 29 July 1864, renders permissive the use of the metric system of weights and measures, which with their equivalents in the usual system are set out in the schedule to the Act.

For the standard of surface for Land measure, the French took the square of ten mètres on each side, or one hundred square mètres; this is the *are*. The standard of capacity for liquids was determined by finding a cylindrical volume equal to a cube, whose edges are formed by tenths of the linear standard; this is the *litre*. The weight of a litre of distilled water at its maximum density was adopted for the standard of weight, and called a *kilogramme*, the *gramme* being a thousandth part of it. The multiples of these, proceeding in decimal progression, are distinguished by the employment of the prefixes *deca*, *hecto*, *kilo*, and *myria*, from the Greek; and the subdivisions by *déc*, *cent*, and *milli*, from the Latin. The following units of French measures and their equivalents in English will be found useful. The MÈTRE, the measure of length, = 39·37079 ins., or 3·280899 ft., or 1·0936331 yards, or 0·0066124 mile. The ARE = 100 square mètres, the square or measure of surface = 1076·429934 sq. ft., or 119·603326 sq. yds., or 3·9538290 sq. perches, or 0·0988457 sq. rods, or 0·0247114 sq. acre. The LITRE, the cubic or measure of capacity, = 61·02705 cubic ins., or 0·035317 cubic ft., or 1·76077 pints, or ·2200967 galls., or 0·275121 bushel. The GRAMME, the measure of weight, = 15·43235 grains, or ·032151 troy oz., or ·0022016 avoird. lb., or ·0000197 cwt., or ·0000010 ton. These equivalents are worked out in detail in WHITAKER'S *Almanack*, 1875, p. 309. The Act of 1864 puts the Mètre at 1 yard 3·3708 ins.; the Are at 119·6033 square yards; the Litre at 1·76077 pints; and the Gramme at 0·56438 drams.

Tables of decimal equivalents of Imperial and Metric weights and measures are given in the *Second Report of THE STANDARDS COMMISSION*, fol., Lond., 1869, App. vii, pp. 130-33: and an exhaustive investigation of the relation of the metre to British measures will be found in Appendix ix to the *Fifth Report*, 1871, p. 148, by H. W. Chisholm, warden of the standards. RUTTER, *Metric System of Weights and Measures*, 8vo.

In the following table will be found simple methods of calculating in round numbers some of the French measures; they will be found with all ordinary numbers to give a result within one per cent. of the truth. CIVIL ENGINEER, etc., *Journal*, 1838, i, 405.

To reduce English miles into metres: multiply by 16 and add two figures to the result. The true quantity is 1609. To reduce metres into miles: cut off two figures and divide by 16.

To reduce yards into metres, multiply by 9 and cut off the last figure. To reduce metres into yards, cut off the last figure and multiply by 11.

To reduce pounds sterling into francs, add two figures and divide by 4. To reduce francs into pounds sterling, multiply by 4 and add two figures.

Subjoined are a few of the principal ancient French measures as given in GWILT, *Encycl.*, Glossary.

| | | | | |
|-----------|---------------|---|-----------|--------------|
| A toise = | 6 French feet | = | 6·394665 | French feet. |
| A foot = | 12 " ins. | = | 12·78936 | English ins. |
| An inch = | 12 " lines | = | 1·06578 | " |
| A line = | 6 " points | = | 0·088815 | " |
| A point = | | = | 0·0148025 | " |

METRETA. An ancient measure; see MET.

METRODDES or METWANDS. The measuring wands, rods, or rules, used by workmen; as so termed in SURTEES SOCIETY, *Fabric Rolls of York Cath.*, 8vo., Durham, 1859, pp. 83, 88, 347.

METRODORUS. A native of Persia, and the earliest known Christian architect. He built in India, fortifications, baths, etc., introducing into that country a branch of science till then unknown (MARTUND). Returning into Persia he found the Christians under persecution, and went to Constantinople, where he obtained the favour of Constantine: hence the dates 313-323 for the last two facts. CEDRENS, *Compend. Hist.*, fol., 1648.

A METRODORUS built a retaining wall to the temple at Cadachio, as stated in an inscription referred to by RAILTON, in vol. iv of STUART and REVETT, *Antiq. of Athens*, fol., London, 1830. The temple is supposed to date B.C. 470-435. There were others of the same name, some who wrote upon geography, medicine, and architecture; VITRUVIUS, edit. by MARINI, fol., Rome, 1836, ii, 167.

METROSIDEROS VERA. A tree of China and Japan, supplying the true iron wood, which is very hard and heavy; in Japan it is so scarce and valuable that it is only allowed to be manufactured for the service of the king. In China it is used for anchors: it weighs 53 lbs. per cubic foot. 71.

METSYS (JOSSE), executed 1476 the railing of wrought iron to the double stone staircase destroyed 1709 in Louvain cathedral: he probably made the drawing, dated 1507, of the proposed towers and *portail*; and aided by the sculptor J. Beyeart, certainly executed the model of it, which still exists. The twelve-branched chandelier of wrought iron, as also the ornamented iron crane for moving the cover of the font, were made 1505 by him, and not by Quentin Matsys as is usually stated. WEALE, *Handbook to Belgium*, etc., 12mo., London, 1859; see also LOVEN for *Illustrations*, etc., of these works.

METZ (the Latin *Divodurum* of the Mediomatrici). Under the Romans it rose to considerable importance, being traversed by six grand military roads. At or near Sablon, 1½ miles south of Metz, probably the site of the Roman town, were an amphitheatre said to have been as large as that at Nîmes, a *naumachia*, and baths; the materials of all these were used in the fortifications of the seventeenth century. The aqueduct brought water from Gorze, more than six French leagues distant; many arches remain, as noticed *s.v.* AQUEDUCT, p. 13; the arch, 64 ft. high, under which the road to Nancy passes at Jouy, supports two parallel canals, together 11½ ft. wide. LABORDE, *Monumens de France*, fol., Paris, 1816, pl. 15-6. In 1866 this water was brought into the city and supplies numerous fountains. 23.

On the decline of the house of Charlemagne, Metz passed to the emperor of Germany, in 1552 it was seized by France under a false pretence, and in Sept. 1870 was ceded to Germany. It is situated on both sides of the river Moselle at its junction with the river Seille. It is walled, has six or nine gates with drawbridges, and was regarded as the strongest fortress in France. Most of the streets are narrow and winding, several on the right bank being inaccessible by carriages; the houses generally are built of hewn stones; the best parts of the town are along the quays, the opposite sides of which communicate by ten bridges over the Moselle, and ten over

the Seille. A stone house of the tenth century in the rue des Trinitaires, is given with details in VERDIER and CATTOIS, *Arch. Civile*, 4to., Paris, 1855, i, pp. 153-5. The episcopal country residence called the château de Frescati is by R. de Cotte.

The cathedral dedicated to S. Etienne is in the form of a magnificent Latin cross. The foundations were laid early in the eleventh century; in 1214 the city laid a tax upon foreign merchants, half of which was devoted to this building; but it was only in 1332 that the works were carried on with activity. The lower part of the nave is in the style *ogivale primaire*, the upper part *ogivale secondaire* having been completed 1480; the choir, apse, and transepts are *ogivale tertiaire*, 1486-1519. From 1478 the wooden tower was almost rebuilt of stone in three years by Renconnaux of Metz; the spire of open work, 397 ft. (363 MURRAY) high, was completed 1801. The painted windows by Antonie Bousch of Strasburg, date 1521-6, in which latter year the building was completed and consecrated. ABEL, *L'œuvre du peintre-verrier Herman à la cath.*, 8vo., Metz, 1865. The portico of the Doric order was put up by J. F. Blondel for Louis XIV in 1765. The building is 397 ft. 6 ins. total internal length (or 407 ft. 10 ins., or 401 ft.); the nave about 52 ft. 6 ins., or 47 ft. 9 ins. wide, is 109 ft. or 144 ft. (138.6 Engl. feet as measured by Mr. Penrose) high to the vaulting, and the entire width with the aisles about 100 ft.; the aisles or chapels being 23 ft. 7 ins. wide on each side of it. A font of porphyry 10 ft. long, 5 ft. wide, and upwards of 3 ft. in height, was obtained from the Roman baths in the vicinity. LABORDE, *Monumens*, pl. 199. BOURASSÉ, *Cath. de France*, 8vo., Tours, 1843, p. 183. SIMONAU and VOISIN, *Principaux Mons. Goth.*, fol., Brux., 1843, gives a view. BÉGIN, *Hist. et descr. pit. de la cath., les églises, etc.*, 8vo., Metz, 1842; and 1847. JACOB, *Recherches hist. sur la tour et la cloche de Mutte de la cath.*, 8vo., Metz, 1864. The church of Notre Dame de la Ronde, the choir of which was built 1130; S. Simon; S. Eucaire of the 12th century; and S. Vincent dating from 1248, with a portal having a triple row of columns, are among the nine churches; there are also four nunneries and a synagogue. LENOIR, *Histoire des Arts en France*, fol., Paris, 1811, gives pl. 50-1 the chapel of l'église des Grands Carmes.

Among the other public buildings most deserving of notice are the arsenals, the military hospital, and several barracks; the palais de justice, built 1776; the museum and library of 30,000 volumes and 1157 MSS. of the tenth to thirteenth centuries; the prefecture, the mint, etc. In the British Museum, King's Library, is a plan and report respecting the buildings erected and alterations made 1727-60 by order of the duc de Belleisle. J. F. BLONDEL designed a plan 1763 (*Cours*, iv, 395) for the improvements of the city, consisting of the *plateforme de S. Etienne* and its fountain; the nave, with a round sacristy, to the church of the royal abbey of S. Louis des dames chanoines; the episcopal palace, the *hôtel de ville* 1771, a *corps de garde*, and other works. A covered market was erected about 1836. 14. 28. 50.

CAJOT, *Les Antiq. de M.*, 12mo., Metz, 1760. BÉGIN, *Metz depuis dix-huit siècles*, 3 vols., 8vo., Paris, 1846. HUART, *Notice sur l'abbaye de S. Glossinde à M.*, fol., Metz, 1843. CAIGNART DE SAULCY, *Recherches sur les monnaies de la cité de Metz*, 8vo., 1836; and *des Evêques de M.*, 8vo., 1845 (?). DOM, *Histoire*, 4to., 1769. HUGUENIN, *Chroniques*, 8vo., 1838. JACOMIN, *Chroniques*, 8vo., 1870. DUMONT, *Salles de Spectacles*, fol., Paris, 1774, gives the theatre. L'UNION DES ARTS, vol. i, gives l'église de S. Martin, and vol. ii *Le palais des Treize*. RONDELET, *L'Art de Bâtir*, notices that in the neighbourhood of Metz is obtained a very hard strong stone, from which lime of a superior quality is made; this, when newly burnt and mixed with gravel, forms a *béton* of which the consistency is so great that vaults are constructed of it without bricks or tiles, becoming in time a single piece, as hard as stone itself.

METZGER (EDUARD), completed the queen's villa near the Siegesthor, as well as the triumphal arch, so called, in the Ludwigstrasse at Munich, after the death of F. von Gaertner in 1847. He published *Sammlung Griechischer bauprofile und beiträge zur lehre der profil-zeichnung*, fol., Munich, 1839; *Ornamente aus Deutschen Gewächsen*, 36 pl., fol., 1842; *Münchener wohngebäude*, fol., 1846; *Bürgerliche baukunde in vorlagen für Mauer- und zimmerwerk-kunde*, 74 pl., fol., 1847, with THIERSCH, *Ueber das Erechtheum auf der Akropolis zu Athen*, 4to., 1850; *Formenlehre zur Rundbogen architecture mit anwendung auf den verband von gewölbe und eisenconstruction*, fol., 1851; and perhaps a work entitled (as translated) *Doctrine of Architectural Construction*, 200 pl.

METZINGER (HANS), worked with W. Koch till 1554 on the choir of the *münster* at Freiburg im Breisgau.

MEUDON QUARRY, near Paris, supplied the stone for the weathering and upper member of the cornice of the pediment, the central feature of the east front, or Perrault's colonnade, at the Louvre; a single stone, sawn like a piece of wood into two blocks, each 54 ft. long, 8 ft. wide, and only 18 ins. thick, one of which was broken into three pieces while being set in place; PATTÉ, *Etudes d'Arch.*, 4to., Paris, 1755, p. 8, and pl. 17. In the edition of VITRUVIUS, by Perrault, 2nd edit., 1684, the machine by which these huge stones were raised is detailed.

The description of two quarries at Meudon, illustrated by sections, is given in DALY, *Revue Générale*, 4to., Paris, 1852, p. 278, and pl. xiii, giving the *Report* made to Colbert in 1678 on Building Stones in France.

MEUHASEEN (GIAFAR BEN), see BEN MEUHAZIN (G.).

MEULAN (WALTIER or WAULTIER DE), who succeeded Enguerrand or Ingelramme in the second year 1216, completed the church of the abbey at Bec in Normandy, which had been in twenty months half completed: DEVILLE, *Revue des Arch. de Rouen*, 8vo., Rouen, 1848, p. 10. WHITTINGTON, *Hist. Survey*, 8vo., Lond., 2nd edit., 1811, p. 66. Little of this edifice now remains.

MEUSNIER or MEUNIER (PHILIPPE), born 1659 (1655 in DUSSEIUX, *Les Artistes Franç.*) at Paris, was a pupil of Jacques Rousseau. He was chiefly celebrated for painted architectural decorations in the chapel at Versailles, at the Palais royal, etc. He is said to have designed the theatre at Nismes. Having retired from Paris to Munich in disgust, Louis XIV, informed of his absence, ordered him to return to France, about 1700-2. About 1720 he designed the decorations for the theatre at Bruxelles. He died 27 Dec. 1734.

L. MEUNIER published *Vues des palais et jardins de plaisance des rois d'Espagne*, fol., Paris (cir. 1665).

MEUZIO (GIOVANNI), sculptor of Siena, was 1445 employed as architect to the duomo at Orvieto. 67.

MEVANIA. The modern BEVAGNA, in Italy.

MEWS. This term was originally given to a court or yard where hawks were kept while changing their feathers, and thence in a more extended use, to a place for "mewing" or moulting, i.e., changing of feathers, hair, etc. The king's mews at Westminster is noticed several times in the accounts entered in the chancellor's roll 5th Edward I, now in the British Museum, and is unquestionably the same place, and was used for the same purpose as the "Mewe" at Charing Cross, where king Henry VIII kept his hawks whilst moulting. The following explanation of a French term of similar import is not usually noticed, though the edifice *Mue* was apparently employed for the building for the same purpose as above explained. "*Muette*. C'est le nom qu'on donne à un édifice élevé au bout d'un parc de maison royale ou seigneuriale, pour servir de logement aux officiers de la venerie, et dans lequel il y a aussi des chenils, des cours, écuries, etc. Ce terme muette vient, dit-on, de mue, parceque c'est dans ces maisons que les gardes, et autres officiers de chasse, apportent les mues ou bois que les cerfs

quittent et laissent dans les forêts"; LACOMBE, *Dict. port. des Beaux Arts*, Paris, 1759, new edit.

The name is now all but exclusively given to a yard or to a thoroughfare consisting wholly or principally of stables and coach houses. When a thoroughfare, it is generally formed parallel to the main street, and should be at a sufficient distance in the rear of the houses to prevent the odour from the stables being offensive to the inmates of the houses. As the carriages and animals are usually cleaned in the roadway in front of the stables, it should be well paved, and with such falls of surface as to allow the great quantity of water to readily run off and find its way into the drains. A good supply of water is a prime necessity. Although dungpits must be provided, it is now recommended that the dung should be removed from the crowded parts of towns at least three times a week, or, if not so often, that some disinfectant should be used. As the frontages have, of necessity, a level communication with the roadway, paved footways can only be continued for very short intervals, and are in most cases dispensed with. R. E. P.

MEXARIS. One of the writers on architecture whose works were extant in the time of VITRUVIUS, i, 1; vii, pref.; x, 19.

MEXBOROUGH STONE, see DONCASTER STONE.

MEXICAN ARCHITECTURE. Sufficiently correct data for an accurate history of the antiquities of this part of North America are still wanting; the following notice of the important ruins is condensed from FERGUSSON, *History*. Further detailed notices will be found in this Dictionary under the most important of the cities named. The Mexican Annals commence with the arrival of the Toltecs in Anahuac about the fifth or sixth century (about 648 is also stated). For three hundred or four hundred years they lived in peace and prosperity, covering the table land, it is said, with their monuments. Evil times drove them away; and it is considered they migrated (1051) southwards to Yucatan, where it is usually assumed they erected the works now found in that country. The Aztecs took the place of the Toltecs in the middle of the twelfth century; and by the addition of successive immigrations of tribes, they had at the time of the arrival of the Spaniards (1519) fully repopulated the valley, and elaborated a very considerable degree of civilisation.

The principal monuments of the valley of Mexico are situated in a small tract in the centre of the tableland of Anahuac. These consist of *teocallis*, houses of God, the temples of the people. They are pyramids formed in terraces with flat tops, and always surmounted by a chamber or cell, which is the temple itself, where the ceremonies were exhibited to the people. That at CHOLULU is said to be as old as the early Toltecs; and the great *teocalli* (afterwards destroyed) of Mexico was only finished five years before the discovery 1518 of America by Columbus. The former is about 1440 ft. square and 177 ft. high, divided into four stories, on which the cell is built. There are two at TEOTIHUACAN, and others at TEZCUCO. The most interesting of those yet brought to light is that of XOCHICALCO. TAYLOR, *Anahuac*, 8vo., Lond., 1861, pp. 188, 194, gives to it the date of 945. One-story examples abound, of which that at OAJACA is generally known.

The monument, palace, or temple at MITLA is entirely original; its walls slope *outwards*, which is exceptional, and the panels are filled with frets and forms only seen in Mexico. There are subterranean apartments also; but nothing has been found to indicate the date of its erection.

Yucatan is a province as rich in architectural remains as any of the same extent in the old world, and is a contrast in that respect to Mexico. STEPHENS and CATHERWOOD have described between fifty and sixty old cities, and others are said to exist in the centre of the land even of more importance than these. UXMAL, PALENQUE, KABAH, CHICHEN-ITZA, and others, are really magnificent. The latter author (p. 8 of his folio work) says: "I do not think we should be safe in

ascribing to any of the monuments which retain their form a greater age than from 800 to 1000 years; and those which are perfect enough to be delineated, I think it is likely are not more than from 400 to 600 years old". In other words, remarks FERGUSSON, they belong to the great building epoch of the world—the thirteenth century, or a little before or after that time.

The principal monument is the *Teocalla*, rising at an angle of about 45 deg. to the level of the platform on which the temple stands: an unbroken flight of steps leads from the base to the summit; that at PALENQUE is the finest. The palaces appear to be of all dates, from those evidencing a direct copy of wood construction on a stone base, in which are square-headed openings, as at Chunjuu or CHUNHUHU, to those in which the superstructure is elaborately carved with masks, scrolls, and carvings. Sometimes pillars are used, as at Zayi, where the building rises in a pyramidal form in three terraces, being 260 ft. by 110 ft. at the base. The buildings are often erected round a courtyard, as in that called the *casa de las Monjas* at UXMAL, one of the most remarkable buildings in Central America for its size, as well as for the elaborateness of its decorations. The *casa del Gubernador* in the same city is larger and even more elaborate in its decorations than the principal of the three edifices forming the first mentioned one. The roofs of most of the supposed earlier buildings no longer remain, but many of the lintels of the doorways are formed of beams. The apparently later roofs are formed at the upper parts by bringing the courses of stone nearer together, till they meet in the centre; as at Uxmal, in a chamber 13 ft. wide. A still more remarkable instance is seen at CHICHEN-ITZA in a room 19 ft. 8 in. by 12 ft. 9 in., in the centre of which are two stone pillars. The bas-reliefs are generally executed in stucco, and are well preserved; the painting on these and on the walls being still bright and fresh.

The FOREIGN QUARTERLY REVIEW, Oct. 1836, XVIII, contains an article on the subject; and the PENNY CYCLOPEDIA, 1839, has an interesting account, and notices the Cyclopean roads and bridges carried on a continued level across valleys; and the rock-hewn caverns; also, GWILT, *Encyclopædia*, 1845. GAILHABAUD, *Monuments*, 4to., Paris, 1850, iv, gives, *Monuments Mexicains*, illustrated by six plates of those at Uxmal, one of Labnah and one of Kabah, in Yucatan; with four others showing *teocallis* at Papanla, Santiago Guatasco, Tusapan, S. Cristoval Teapantepec, near Tehuantepec, and near Tehuacan, all in Mexico. CHARNAY and VIOLET LE DUC give Photographs of Mitla, Palenque, Izamal, Chichen-Itza, and Uxmal, 8vo. and fol., Paris, 1862-63.

PRESCOTT, *Hist. of the Conquest of Mexico*, 4th edit., 8vo., 1849. CLAVIGERO, *Hist. of Mexico*, transl. from the Italian of 1780 by CULLEN, 4to., Lond., 1787. RANKING, *Hist. researches on the conquest of Peru, Mexico, etc., in the thirteenth century, by the Mongols*, 8vo., 1827. FANCOURT, *Early History of Yucatan*, 8vo., 1853. BERNAL DIAZ DEL CASTILLO, *Historia*, fol., Madrid, 1632. HUMBOLDT, *Atlas Pitt.*, fol., Paris, 1810-3, but considered not very trustworthy. LORD KINGSBOROUGH AND AGLO, *Antiq. of Mexico*, 9 large vols., fol., Lond., 1830-48; which contains DUPAIX, *Viages, etc.*, in vi. LENOIR (M. A.), *Parallèle des anciens monuments Mexicains avec ceux de l'Egypte, de l'Inde, et du reste de l'ancien monde*, in BARADÈRE, *Antiq. Mex.*, fol., 1834-6; also containing DUPAIX, *Relation, etc.*, in 1805-7, i, 1834. NEBEL, *Voyage Pitt. dans le Mexique*, fol., Paris, 1836. WALDECK, *Voyage Pitt. d'Yucatan*, fol., Paris, 1838. BRAUNSCHWEIG, *Ueber die Alt-Amerikanischen Denkmäler*, 8vo., Berlin, 1840. GUALDI, *Mons. de Mejico*, 4to., 1841. NORMAN, *Rambles in Yucatan*, 8vo., New York, 1843. STEPHENS, *Incidents of Travel in Central America, Chiapas, and Yucatan*; two series, 8vo., New York, 1841-43; 4 vols. Lond., 1842-3; new edition revised by CATHERWOOD, 8vo., Lond., 1854. CATHERWOOD, *Views of Ancient Monts.*, 25 pl., fol., Lond., 1844. SQUIER, *Travels in Central America*, 8vo., 1854. PURCHAS, 66 pl.

Captain VETCH has described in the *LONDON GEOGRAPHICAL Journal*, vii, p. 1, a collection of stone figures in his possession procured from the banks of the river Panuco. *ALL THE YEAR ROUND Journal*, 1863, ix, 35, gives an account of the Aztec, Mexican, Peruvian, and Toltec, nations; and 1869, p. 540, describes the ruins of Pecos, Guarra, Wegegi, Gran Quivera, and Abo, being Aztec and Indian villages in New Mexico.

MEXICO. The Tenochtitlan of the Aztecs, founded 1325, the capital of the state of the same name in North America. When taken 1521 by Hernan Cortes, the city stood on several islands in lake Tezcuco, and was approached by four great causeways, but the lake has since receded; and the present city, though occupying the same site, is now about two and a half miles from its shores. This alteration was assisted by a cut through the rocks 12 miles in length, 150 ft. deep, and 300 ft. wide, 1609-1789, which carried off the water of the lakes draining into the Tezcuco, into the Panuco, and so to the gulf of Mexico. The city is built with the utmost regularity in the form of a square, and enclosed by lofty walls. The streets are long and spacious, and, being at right angles to each other, form blocks of massive and uniform structures around a central square of 12 to 15 acres, in which are most of the public edifices. The houses are almost all built of hewn stones, of amygdaloid or porphyry, three or four stories in height, with flat roofs having iron railings and tile paving. Many of the buildings have gradually sunk as much as six feet without any visible alteration in the body of the building. Water being found at a few feet from the surface, the chief buildings are founded on piles. A view of a street is given in the *ILLUSTRATED LONDON NEWS*, 1845, vi, 33, and the cathedral on p. 65.

At the south-east angle of the great square is the residence of the president. It stands on the site of the palace of Axayacati, in which Cortes was lodged by Montezuma; and is a quadrangular pile several hundred feet square, having four large square courts in the interior, and lodges not only the president and his family, but also contains the principal government offices, the supreme court, the chamber of deputies, and that of the senate (both of these chambers are very elegant), the prison, the mint, the botanic gardens, the library, printing office, museum of antiquities, etc. On the south side is a fine row of houses, in the centre of which is the palace built by Cortes. On the south is the *casa municipal*, or town-house and exchange. Near to the palace is the university, which contains the national museum, and has in front of it a magnificent modern market. The west side is formed by a range of buildings, with shops, granaries, etc. The *mineria* or school of mines, a large building, is one of the best; it was built about 1790, and is "designed in a pure taste and magnificent style". The *acordada* or great prison will contain above 1200 persons. The town-hall, the president's palace, and the post-office formerly the palace of the emperor Iturbide, are given in *ILLUSTRATED TIMES Newspaper*, 1863, iii, 36.

The cathedral (the principal front of which faces the south), dedicated to the Assumption of the Virgin Mary, is built on the site of the great *teocalla* or pyramid temple of the god Mixitli of the Aztecs, and occupies the north side of the *plaza mayor* or great square. It is 500 ft. long, about 420 ft. wide, and is capable of holding 30,000 persons. The design is partly bad Gothic, and partly an Italian style; it was commenced 1573, but only completed 1791. The execution was directed by El capitan M. Davila: his nephew and successor Rodrigo was engaged 1586 upon the works. The walls, which have sunk as above noticed, are formed of unhewn basalt; the front is covered with the most elaborate carving in the Italian style, and is terminated by two towers. The lofty interior is described as being "very gorgeous, exhibiting in great perfection the splendour of the Roman Catholic ceremonies." The choir is formed of rare carved woods, and covered with gilt images; the other parts of the church being loaded with

columns, statues, shrines, fonts, etc., silver crosses, lamps, candleabra, and other decorations. The massive silver railing (BULLOCK, *Mexico*, 1825, says the metal resembles brass), about 100 ft. long, to the high altar, is said to have been cast in China, from models sent from Mexico. It is also described in WALTON, *Present State of the Spanish Colonies*, ii, as noticed in *CIVIL ENGINEER*, etc., *Journal*, 1847, p. 264. The *sagrario* attached to the cathedral is a vast chapel, "bizarre and baroque", being erected in the Churriguesque style. The only works of art of the inhabitants before the Conquest now publicly seen, are the great Calendar stone placed near the north-west corner of the cathedral, 12 ft. in diam., cut from one block of porous basaltic stone; and the sacrificial stone or altar sunk in the square, within a hundred yards of the above stone, the upper surface only being exposed to view.

About fifty to sixty, if not eighty, churches and convents are possessed of considerable riches. S. Domingo, having a spire and dome, one of the best, was designed soon after 1573 by F. Becerra. The convents of S. Francisco, S. Augustine, and La Merced, are immense structures, with numerous spires and cupolas; the last is admired for its interior; it is, with the church of S. Domingo, and the cathedral, illustrated in PHILLIPS AND RYDER, *Mexico Illustrated*, 26 pl., fol., Lond., 1848. The causeways; the great aqueduct leading from S. Fé to the city, 11,155 yards long, supported in one-third of its course on stone and brick arches; and the Chapultepec aqueduct, 3,608 yards long, resting on 904 arches, 9 ft. 6 in. wide, with piers 4 ft. thick; the stream 2 ft. 3 in. wide, and 3 ft. deep; the public fountains; the colossal equestrian statue of king Charles IV, now at the university, the work cir. 1800 of a Spanish artist, Sig. Tolza, of Mexico; the theatre, said to be of no architectural merit but highly praised for its accommodation (*BUILDER Journal*, 1846, iv, 34), reported to seat ten thousand persons comfortably; the *plaza de toros* for three thousand spectators; are among the other chief features of this city. Situated about a league distant, is the palace of Chapultepec, built at an immense cost on a rock by the viceroy Galvez, cir. 1780; it is properly a fortress, and was in a very dilapidated state in 1823; a view is given in PHILLIPS AND RYDER's work. 14. 50. 96.

CHAPPE D'AUTEROCHÉ, *Voyage en Californie*, 4to., Paris, 1772, which gave the best account of that time, was copied in BIGLAND, *Geog. View of the World*, 8vo., Lond., 1810. BULLOCK, *Six Months in Mexico*, 8vo., Lond., 1824, with an ancient map, and one of 1793; also his *Exhibition of Ancient Mexico*, a descriptive catalogue of the casts, drawings, etc., he had collected in his travels, 8vo., Lond., 1824. A bird's eye view of Mexico, and a view of the great square and cathedral, two plates 19½ ins. by 13¼ ins., drawn by G. Ackermann, and engraved by R. G. Reeve, 1826. COMMISSION SCIENTIFIQUE DU MEXIQUE, published at Paris. *Mexico and the Mexicans*, 1846. EGERTON, *Views in M.*, 1840. MAYER, *Mexico, as it was and as it is*, 8vo., New York, 1844; and his *Mexico, Aztec, Spanish, and Republican*, 8vo., Hartford, 1852; and *Observations on Mexican History and Archeology*, Smithsonian contributions to knowledge, 8vo., 1848, ix. A panorama of the city, painted by — Burford and H. C. Selous, was exhibited 1853 in Leicester Square.

MEYDA (ALONZO DE), an error in MILIZIA, for MAEDA (ASENSIO DE).

MEYERS or MYERS (GRAHAM), carried out 1759-80 as architect the works at Trinity College, Dublin, from the designs of Sir W. Chambers. (DUBLIN, p. 77.) MALTON, *Views of Dublin*, fol., Lond., 1792.

MEYNUL (BERTRAND DE) of Genoa, who was also a sculptor, appears in the accounts of the building of the château de Gaillon in France, 1502-10, with Geraulme Pacherot, but really were engaged only upon a fountain; DUSSEUX, *Les Artistes Franç.*, 8vo., Paris, 1856, liii.

MEZIERES, see CAMUS DE MEZIERES (N. DE).

MEZZANINE (It. *mezzano*; *mezzanino*; Sp. *entresuelo*; Fr. *entresol*; Ger. *zwischen-geschoss*). A story of small height introduced between two higher ones, and generally showing on the outside of the edifice. Such a story is also called in England by its French name *ENTRESOL*. "The *sala* is the common hall of the palace . . . and being loftier than all the apartments on the same floor, it leaves in the intermediate height a range of low rooms, which give rise to vicious *mezzanines*", FORSYTH, *Remarks*, 8vo., Lond., 1816, p. 172.

MEZZO-RILIEVO. An Italian word signifying a work executed in a half relief, and called "low relief" in English; that is, a *bas-relief* having some portions projecting and detached, but not so much as an *alto-rilievo*.

MHOW or Mow. Near to this town, in Bundelcund, in the presidency of Bengal in Hindostan, is a temple to Siva or Kurkotuc Nāg, one of the eight *nāgs* or serpents, attendants of Mahadeo (Siva), given in KITTOS, *Indian Arch.*, fol., Calcutta, 1838, pl. 9. At another Mhow near Poonah in Aurungabad, is a rock-cut tomb, described by RAMÉE, *Manuel de l'histoire*, 12mo., Paris, 1843, i, 84, as at Mhar.

MIACO or MEACO. A large city of Japan in the island of Nippon, built on an extensive plain on the river Yedogawa. It is the residence of the Mikado or spiritual emperor, the seat of his *dairi* or court, and hence the ecclesiastical capital of the empire, corresponding to YEDDO, where the Siogoon or military emperor holds his court. It is about four miles long and three wide, abounding in exquisitely laid out gardens, palaces and temples; the houses are for the most part built of wood, plastered with lime and clay, two stories high, and placed in long and narrow, but regular lines of streets. Its manufactures are of a kind and quality far superior to anything that is allowed to be exported to Europe. 50.

MIA-MIA. The name in Australasia for the hut formed by the aborigines of stout limbs of trees, forming a cone high enough to permit the tallest man to stand upright, covered with grass and then with turf, like slating. On one side was an opening; the fire was in the centre, around which a dozen might squat easily. In these the natives spent their winters; if a bush fire destroyed the huts, they were rebuilt, to be again burnt down; thus in course of numerous generations mounds have been formed, the origin of which has puzzled the modern settlers. THE AUSTRALASIAN *Newspaper* for 1868, March 7, 14, 21, and 25, in which the mounds are also called "Native" and "Blackfellows'" ovens.

MIAZZI (GIOVANNI) born 1699 at Bassano, the son of Antonio, a carpenter, and nephew of Trevellini, a painter, was brought up to his father's business, but at fourteen years of age, having evinced a taste for architecture, he studied the works of the Italian writers without a master. He designed a small theatre at Bassano, a casino for the signori Caffi at Rossano, and the church of La Trinità in the borgo Angarano. When forty years of age he benefited by instruction from F. M. Preti, his junior in years, and adopted his plans and style, and the proportions arising from the harmonic medium. He rebuilt the church of S. Giambattista at Bassano, on the foundations of the old one, in the form of a portion of an ellipse, retaining the other buildings around it; the difficulties attending this design and the façade are detailed by MILIZIA, *s. v.* The collegiate church at Schio was also designed by him, except the presbytery; the church at Valdagno; that at S. Vito near Schio; and of Simonzo; the little church of the conservatorio delle Zitelle at Bassano; and many others in the neighbouring places. His last work was the church of the monastery of Monte Gargano, in Puglia.

His best work was the palace for the family of Spineda at Venegazza in the Trevigiano, in which he included the other buildings right and left, commonly called Barchessi, one of which terminated with a chapel, and the other with a green *berceau*; these wings, with the connecting arcades, have been destroyed. He superintended the erection of the theatre at

Treviso, designed by Bibiena, but designed the internal arrangements, the façade and vestibule. MILIZIA states that Miazzi had the merit of banishing the Borrominean taste introduced by B. Tabacco. At eighty years of age his mind and body were equally vigorous; the date of his death is not given. His son Antonio was also a disciple of Preti. 3. 14.

MICA. A mineral, of which silica and alumina are the principal constituents. It is found in granite together with felspar and quartz, often decomposed by the weather, and when worn down it mixes with the clay of the felspar and the sand of the quartz. Mica is composed of silica 43, oxide of iron 22, clay 11.5, potash 10, and magnesia 9. It is a prism with rhomboidal bases, with obtuse angles of 120 deg. The colour varies from pearly or silver white or grey, through greenish yellow and reddish shades, to a dark brown and black. It always has a certain lustre, and is hard and dry to the feel. It is found in such large plates in many mountains, as to be used as a substitute for glass, being semi-transparent, tough, flexible, and elastic. In Siberia, some specimens are obtained 2½ yards square, which are employed in Russia as glass, and also in India. Others come from the environs of Tulle, or Tula, south of Moscow, and from near that city.

J. GLYNN, *On the use of Mica in windows of workshops*, read at Inst. of Civil Engineers, 1840 (*Proceedings*, i, 43), and CIVIL ENGINEER, etc., *Journal*, iii, 346, notices its use at the Butterly Iron Works, where any piece of iron flying against it makes merely a hole large enough to allow it to pass, while the other parts remain uninjured. Its not being so transparent was not an inconvenience, as the vapour from the blast furnaces acted upon glass, giving it the appearance of being ground. Mica was a little more expensive, but its duration would render it more economical. It could be obtained from Pennsylvania or from (some parts of Siberia) Russia, where it is commonly used for windows in farm houses, and also on board ships of war, as it is less liable to be fractured by the concussion of the air during the discharge of heavy artillery. Mica is not unlike talc, and is susceptible of very minute subdivision, as, according to HAÛY, it may be divided into plates no thicker than 300,000 of an inch.

Notes of Mica as used for various decorative purposes, are given in *BUILDER Journal*, 1862, xx, 339; and *BUILDING NEWS Journal*, 1867, xiv, 501. JACKSON, *Minerals and their uses*, 8vo., Lond., 1849. 14 Sup.

MICA SLATE or MICA SCHIST. A stratified rock found in nearly all mountainous regions, mostly in connection with gneiss, on which it lies, and very often with granite.

The southern highlands of Scotland and the mountains of Donegal in Ireland, offer the most striking British examples of its association and interstratification with granite, gneiss, quartz rock, limestones, clay-slate, etc. In Devon and Cornwall but little trace of either gneiss or mica slate is to be noticed. Its composition is so variable as in some cases to approach granite, gneiss, or clay-slate, according as the mica element, or that with which it is associated, predominates; many other bodies enter into it besides these, and so modify its appearance, but in all it retains its special laminating quality. R. E. P.

MICHAEL (.....), *baumeister* 1368 at Cologne cathedral; *BAUZEITUNG Journal*, 1843, p. 112. Another MICHAEL was employed 1484 on the *dom* at Danzig.

MICHAEL (MACISTER), see CANTERBURY (M. of).

MICHAELANGELESQUE STYLE. The influence of Buonarroti was supreme and disastrous for the art during the 16th century. What he did at S. Peter's and elsewhere was the standard of the day. Too impetuous to be controlled by construction, and too impatient to work out details, he sought by bigness to excite astonishment, and mistook exaggeration for sublimity. Every architect felt himself bound to use as large an Order as his building would admit; and thus even Palladio designed four tall Corinthian pillars on each side of a court in the convent de la Carità at Venice, without considering the

exigencies of the building to which they were applied. However, at the great Farnese palace at Rome, commenced 1530 by A. da Sangallo, who proposed finishing the elevation by a less important story, crowned by a complete Corinthian entablature determined by the pilaster at each angle, Buonarroti, his successor, designed the large cornice, the pride of the building, the grandest architectural feature in modern Rome, and supposed to have been suggested by that of the Strozzi palace at Florence. Its projection and dimension are such as would be appropriate to an Order running through all the three stories (CROWN CORNICE). In the courtyard he marred its grandeur by the vulgar and fantastic details in which he revelled; the brush, and not the square and rule, was the instrument with which his designs were made. All those strange contrasts which may be necessary for architectural decoration painted on a flat surface, are introduced by him, here and elsewhere, in hard stone in relief—an effect displeasing in his own designs, and fatal to his imitators. The museum in the Capitol is the only great group of civic buildings in Rome by Buonarroti; they show early specimens of the large Order running through two stories (and placed on pedestals), afterwards so fashionable, but here used with a vigour that goes far to redeem the impropriety of their introduction. FERGUSON, *Handbook*, 8vo., Lond., 1862, iii, pp. 76, 97, 104, and 111. RAMÉ, *Histoire*, 12mo., Paris, 1846, p. 89, says that to the Italians was due “l’importation du style Michelangélesque, style hardi, mais sans ordre, sans finesse, et du plus d’un mauvais goût”; and “il n’eût fort hereusement qu’un demi succès”. FORSYTH, *Remarks*, etc., 8vo., Lond., 1816, p. 165, notices that “Michael Angelo injured some of his edifices by a passion for the awful and the singular.” His style was much abused by Milizia in his writings.

MICHEL (MEISTER), *baumeister* 1378 at Ulm cathedral. Another MICHEL continued 1434-36 the tower of Frankfort cathedral. 92.

MICHEL AGNOLO, see BUONARROTI (M. A.); and MICHAELANGELESQUE STYLE.

MICHELE (MICHELE), better known as SAN MICHELE (M.).

MICHELIA KISOPA. A tree of Nepal, affording useful wood called *chobsee*, and *champ* or *chaump*. 71.

MICHELIN (PIERRE), is noticed in COMITÉ HISTORIQUE, *Bulletin*, 8vo., Paris, 1843, i, 274, as employed at Troyes, probably in the 14th century.

MICHELINO di Vesuccio, of Milan, a celebrated painter, is named by VASARI among the disciples of Taddeo Gaddi. He was a native of Besuzzo, near Milan; was at Venice in 1410; was living in 1435 (LANZI); and “was not less skilful in architecture; he took a prominent part in the academy instituted by the duke Gian Galeazzo about 1380.” MERRIFIELD, *Painting in Oil*, 8vo., Lond., 1849, i, 13.

MICHELL (HUMFREY). His name is chiefly connected with works at Windsor Castle during queen Elizabeth's reign, between 1570-76, probably rather as paymaster than clerk of the works, though this latter designation is sometimes given to him. On 21 Nov. 1576 he reported progress and requested the queen's further directions; and suggested that H. HAWTHORNE should make perfect plans for the gallery and banqueting house. The date of his death is unknown.

MICHELOZZI (MICHELOZZO, sometimes called Michelozzo di Bartolommeo di Gherardo, and Michelozzo di Borgognone, and in one document, Michele) of Florence, born about 1396 (VASARI), studied drawing and sculpture under Ghiberti and Donatello, and also founding, but subsequently devoted himself to architecture. He commenced (1430 it is stated, but really later), perhaps on the plan of Lapi, the palazzo at the corner of the Via Larga for Cosmo de' Medici, which 1659 belonged to the Riccardi family, by whom it was considerably enlarged, and is now the palazzo del Governo. GRANDJEAN AND FAMIN, *Arch. Toscane*, fol., Paris, 1846, pl. 39-43. It was the first building in Florence after modern rules; the four

well known windows on the ground floor are by M. A. Buonarroti, the rest of the façade by Buontalenti, and the large staircase by G. B. Foggini. He followed his patron to Venice on his banishment 1433, and in that city made many designs and models for public and private buildings (LOMBARDESQUE STYLE). For the monastery of S. Giorgio Maggiore, a house of the Benedictines of Sta. Giustina, he designed the famous library executed at the cost of Cosmo, who supplied the seats, decorations, and many books.

On their return 1434 to Florence, he repaired and enlarged the palazzo de' Signori or palazzo Vecchio, erected by Arnolfo (GRANDJEAN, pl. 32, 77), improved and decorated the chapel, and secured the campanile by strong iron bands. For Cosmo he designed 1436-39 the church of S. Marco for the Observantine Dominicans, and the great monastery with the cloisters, etc., 1439-43 (or 1452 VASARI), but since much altered, as noticed s. v. FIRENZE, and the façade completed 1777 by fra Giov. Pronti; it is described with its paintings in WEBB, *Ecclesiology*, 8vo., Lond., 1848, pp. 334-8. Also the noviciate of Sta. Croce with the chapel and the entrance leading from the church to the sacristy, all still existing. Likewise the palazzo Cafaggiolo at Mugello, like a fortress, surrounding it with ditches (now filled up), and improved the estate; and 1457 the villa Medicea di Careggi, now Orsi, and conveyed water to the fountain thereat. About two miles distance, at a place called il bosco a' Frati, he completed the erection of the monastery of the Zoccolanti (barefooted friars of S. Francis); while at Trebbio he executed various improvements. For Giovanni, son of Cosmo, he designed the noble palazzo at Fiesole, on the side of a hill, making the lower story into stabling and offices, with the apartments over them; it is now the villa Mozzi, and was restored and embellished 1780 by G. Paoletti. Also for him he built the church and monastery of S. Girolamo on the summit of the hill. He also made a design and model for an hospital for those pilgrims, which Cosmo sent to Jerusalem, and for whom he provided; the church and convent founded 1400 were, however, only restored by Michelozzi; a portico was added 1634 to the church by M. Nigetti, and the monastery turned into a villa for Cav. Prior Ricasoli.

He made a design for six of the windows in the façade of S. Pietro at Rome, having the Medici arms, three of which have since been altered into those of the Farnese. At Assisi, where he was sent, he designed a well and a colonnade for the church of Sta. Maria degli Angeli, and directed repairs at the monastery; and while there he prepared the design for the old citadel at Perugia. Returning from thence, he built the palazzo Tornabuoni, afterwards Corsi (a copy of the Riccardi, but plainer); the Doric loggetta at the south corner is by L. Cardi; the palazzo Ricasoli-Zanchini, opposite the borgo Ognissanti (Bocchi, *Bellezze di Firenze*): the palazzo Filippo-Strozzi in the piazza di Sta. Maria degli Ughi (attributed to Lapi); while the palazzo Montaguti, afterwards Niccolini, now Bourtourlin, is attributed to him, but is by Domenico, son of Baccio d'Agnolo. Francesco Sforza, duke of Milan, having presented 1456 one of his palaces in that city to Cosmo, he sent Michelozzo to enlarge and decorate it (A. FILARETE, in B. 25 of his MS., s. n. VASARI, gives a pen and ink sketch of the elevation); it is now the palazzo Vismana, and only the court and external gate remain of the old portion; the gate is given in CASSINA, *Fabbriche di Mil.*, fol., Mil., 1840-44.

For Pietro de' Medici he built the marble chapel of the crucifix in the centre of the church of S. Miniato sul Monte; and soon after he erected (1448), within the church of Sta. Maria Annunziata of the Servites at Florence, the chapel of the Annunciation and the adjoining chapel, rich in marble and gilding, and having four marble Corinthian columns, 17 ft. high; it was carried out by Pagno di Lapo Partigiani, a sculptor of Fiesole; it was greatly altered 1651 by M. Nigetti and F. Silvani. He also built the villa Michelozzi in the environs of Florence.

Michelozzi died in 1460 or 1465 (after 1470—VASARI), in the 68th year of his age (VASARI), but more probably 78th year, and was buried in his own tomb in the church of S. Marco; Q. DE QUINCY says in Sta. Maria del Fiore. His portrait, painted by Fra Giovanni, is in the sacristy of Sta. Trinità, in the figure wearing a black dress. His style was distinguished for its purity; and SELVATICO, *Arch. in Venezia*, 8vo., Ven., 1847, p. 504, suggests he might have been the first to exhibit that phase of the *resorgimento* in which the LOMBARDO family was so eminent. FANTOZZI, *Guida*, 8vo., Firenze, 1842.

GAYE, *Carteggio*, 8vo., Flor., 1839, i, 117-120; 554-560. RUMOHRE, *Italien. Forsch.*, 8vo., Berlin, 1837-31, ii, 241, 292, 295, 362, gives details in relation to the works and descendants of this master. The library is noticed in AMMIRATO, *Ritratti d'Uomini Illustri di Casa Medici*; and also in BISCIONI, *Preface to the Bibliotheca Medico-Laurentiana Catalogus*, fol., Fir., 1752. QUATRENIÈRE DE QUINCY, *La vie des Arch.*, 8vo., Paris, 1830, i, 69-77, giving an elevation of the Medici (later Riccardi) palace. ANGUILLI, *Dei palazzi, etc., appartenenti alla corona di Toscana*, 8vo., Pisa, 1815, p. 223. 3. 73. 77.

MICQUE (RICIARD) see MIQUE (R.).

MIDÆUM or MIDÆIUM. A town formerly situated in the north-east of Phrygia, on the road from Dorylaeum to Pessinus, about half way between Constantinople and Koniye in Asia Minor. LEAKE, *Asia Minor*, 8vo., Lond., 1824, pp. 24-36, states that the valley bears the name of Doganlu, from a neighbouring village, which may mark the site of the ancient NACOLIA; he also describes the tombs and the curious carved face to a rock (p. 22) called by TEXIER, *Asie Mineure*, fol., Paris, 1839-49, i, pl. 56-61, the tomb of Midas, king of Phrygia, about 740 and 570 B.C., who illustrates it with other tombs; two rock-cut faces to tombs; and a very large chamber with a portico of two Doric columns, at Gherdek Kaia-si, cut out of the same reddish coloured sandstone. Eight views are also given in LABORDE, *Voyage en Asie Mineure*, fol., Paris, 1838. "Doganlu, near Seid el Ghazi", is also described by WALPOLE, *Memoirs*, 4to., Lond., 1817, pp. 207-14; and by Baron de WOLF as NIKOLEIA. (LYDIA.) FELLOWS, *Travels in Asia Minor*, 12mo., Lond., 1852, p. 101, considers that Doganlu is Doosulan, and the above inscribed tombs are at Yasilichia or Yazlikaiya, eight miles west-north-west of Kosru Pasha Khany, near Ghumbat. WADDINGTON, BARTH and MANNERT, place Midæum or Mygdonia at the village of Harab Euren or Harab Verani, eight miles east of Seid el Ghazi. Other Phrygian tombs are seen in the neighbourhood. 28.

MIDANO (ANDREA), a pupil of San Michele, built the palazzo publico at Verona, which is generally attributed to Scamozzi. 28.

MIDDELBURG. (The Latin MEDIABURGUM, Medium Castrum.) The capital of the province of Zealand in Holland, is situated near the middle of the island of Walcheren. It is openly built, has numerous squares, of which the *Groote-markt* is the most remarkable; on the north side of it is the town-hall composed of two portions; the principal and side façades are in the Gothic style, 1468-1518; TIRION, *Present State*, etc., 8vo., 1751; but DE KANTER, 8vo., 1824, says improved 1512-8; the latter one at the side, of the Ionic order, was finished 1784. On the north front of the former, 111 ft. long, Middleburg measure, are more than twenty-five colossal statues of the counts and countesses of Zealand, beginning with Dirk, 10th count, and ending with the emperor Charles V, the 34th count, carved by Michel Wynsel, statuary of Mechelen. The abbey church or cathedral, dedicated to S. Peter, commenced before 1312, is a cross church with a large square tower not projecting before the west façade. There are nine (or twelve) other churches, of which the Oostkirk, with a cupola, was designed 1655-66 by — Dryfhout; a synagogue; and other usual buildings. DE JONG, *Bijdrage tot der Gothische Bouwkunst*, fol., Amst., 1847, p. 24. 28. 50.

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MIDDELTON (JOHANNES DE), *cementarius*, contracted 1398 with the prior and monastery at Durham to rebuild their dormitory from the ground, which he had effected up to and including the groining of the lower floor in 1401, when a new contract was made with Peter Dryng to complete the work before All Saints' day 1404. The former contract is given in POOLE, *Hist. of Arch.*, 8vo., Lond., 1848, p. 383, from the SURTEES SOCIETY, edit. of SCRIPTORES TRES, 8vo., 1839, App. CXXX. The latter contract is referred to in (RAINE), *A brief Account*, etc., 8vo., Newcastle, 1833, p. 92; and in the above work, App. CLXXXVII.

MIDDEN, MIDDYN, MIDDING. A term used in the north of England and in Scotland for a dunghap; JAMIESON, *Dict.* It is used also for a receptacle for the soil of the privy, into which ashes and other refuse are put; the matter being cleared out when full, is carted away for manure. The system as carried out at Manchester is referred to by GREAVES, *Our sewer rivers*, 8vo., Manchester, 1866; and in BUILDER JOURNAL, 1866, xxiv, 350.

MIDDLE AGES. The term applied to the period between the decadence of Classic art and the Renaissance. See MEDIEVAL ARCHITECTURE.

MIDDLE GROUND. The central portion of a landscape, sometimes termed "middle distance".

MIDDLE PANEL. The panel formed between the upper and lower ones in a door, and usually the largest.

MIDDLE POINTED PERIOD. The name given by the Ecclesiological, late Cambridge Camden Society, to that period of Gothic architecture in England which Rickman and others have named "the Decorated period".

MIDDLE POST. The same as KING POST in the truss of a roof. 1.

MIDDLE RAIL. The rail of a door, level with the hand, on which the lock is usually fixed, or into which it is inserted if a mortice lock. It is also called the "lock rail".

MIDDLE TINT. A mixed tint in which no bright colours predominate. HALF-TINT.

MIDFEATHER. A term still used in Lancashire for the withe of a chimney or flue; BURNS, *Geodesia improved*, 8vo., Chester, 1771, p. 340.

MIDDLETON (CHARLES), gained 1779 the silver medal of the Royal Academy of Arts in London for the best drawing of the tower and spire of S. Mary-le-Bow church, London, of which building he appears to have superintended some repairs in 1778. He published *Plans, etc., and Specification for the House of Correction in Coldbath Fields*, fol., Lond., 1788, opened 1793, in which, however, he does not give the name of the architect, Sir R. Taylor; it was completed by Sir W. Chambers, and by — Rogers. He published *Pict. and Arch. views for Cottages, etc.*, fol., Lond., 1795. With — Bailey he was surveyor to the parish of Lambeth, and designed 1797 the turnpike at Lower Marsh; he published *The Architects' and Builders' Miscellany*, 8vo., Lond., 1799, with 59 etched plates of no merit; and *Abstract of the Building Act*, 14 Geo. III, cap. 78, 1774, fol., Westm., 1810. His name appears on two large plates of carefully measured elevations of the north and west fronts of Westminster Abbey, published 1803. He was one of the original members of the Incorporated Society of Artists of Great Britain 1766. The late Sir C. Barry, R.A., was one of the pupils of the firm 1810-16. Middleton probably died before 1818.

MIECHOWICZ (FRANÇOIS), a native of Poland, born 1783, died 1852. CHODZKO, in EAST, *Hist. de la Guerre*, 4to., Paris, 1855, etc.

MIGLIAVACCA (MELCHIORRE), cir. 1560 was consulted with others on the works for the cathedral at Milan. FRANCHETTI, *Storia*, 4to., Milan, 1821, p. 144.

MIGNARD, not MAIGNAUD as usually written, a canon of S. Geneviève at Paris, in the reign of Hugues Capet (987-96), is said to have built the *portail* of his church; MILLIN, *Anti-*

guilt's Nationales, 4to., Paris, 1790-9, v., No. 60, p. 14, quoting MOINET, *Vie de S. Geneviève*, p. 253. 19. 56.

MIGNARD (PIERRE), chevalier, brother (VIRLOYS) of Pierre Mignard the painter (both sons of Nicolas Mignard of Avignon, a painter), but cousin german, also nephew, according to other authorities, was born 1640 at Avignon. He travelled a long time in France and Italy. By order of the count de Caylus (CHALMERS, *Dict.*) he measured the temple to Diana (now called La Maison Carrée at Nîmes) in Languedoc, and drew with care the antique edifices of La Provence; these the count was arranging for publication at his death in 1765, and was partly carried out by Mariette. After his return he built many *hôtels*, the porte S. Michel, and the *portail* of the church in the college of S. Nicholas; also a little gem of a theatre in the *place de l'Oule* now converted into a shop. His best work was the Benedictine abbey at Montmajour, near Arles, which being burnt about 1730, was rebuilt by J. B. Franque on the former design. He was *architecte du roi*, and one of the first members of l'Académie royale d'Architecture, and professor in 1671. He was directed in 1678 by Colbert, together with Bruant, Le Pautre, and Félibien, to report on the materials and construction of the old buildings at Paris. This interesting *Report* has been printed by DALY, *Revue Générale*, 4to., Paris, 1852, x., 194, 273, 321, 343, with remarks by César Daly, Viollet le Duc, and A. Michelot—up to which time it had been reserved for the use of the academicians. He died in 1725 (BLONDEL), aged 86 years. He had two sons; one is unknown; but the other, a painter and architect, entered a religious house 1750 at Avignon; an interesting letter dated 20th August 1730, from him to J. B. Franque above mentioned, is given in CHENNEVIERES, *Archives*, 8vo., Paris, 1853, p. 350. 5. 34.

MIGNITLAN, in Oaxaca, see MITLA.

MIGNOT (JEAN) of Paris, called Giovanni Mignotto in Italy, with Jean Campanosen, Campamosia, or Campamios, of Normandy, pupils of N. Bonaventura of Paris (dismissed 1391), were employed 1399 on the cathedral at Milan, and to Mignot. French writers erroneously ascribe the design of that structure; DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1846. He succeeded H. von Gmuenden, who was dismissed for preferring the quadrangular (not the triangular) proportions for the edifice. Mignot continued certain portions; and in reply to an inquiry regarding certain parts of the work, Giordano della Croce, one of the superintending commission, praises him as a *verus operarius geometra*, and *Inzignerius fabricæ*, for having followed the lines of Gmuenden. Campamosia having retired, Mignot was commissioned to consider the best mode of completing the sacristy (Oct. 19), in consultation with four others—Marco da Carona, Giacomello della Venezia, Antonino da Porderno, and Salomone de' Grassi. Mignot entertained considerable doubts regarding the entire structure, which he subsequently reduced under two heads: (a) Whether the arches and vault of the nave ought to be constructed according to the original plan and the indication of the columns, or according to the plan proposed by himself; and (b) a question relating to one of the external piers or buttress (*pilone*). These points were referred 26 March 1401 to a commission consisting of two monks, one a Dominican, the other a Franciscan; three architects (of whom Mignot himself was one); and ten inspectors, including G. della Croce, previously mentioned. The commissioners were greatly divided in opinion. After vehement opposition, the matter was finally referred to the archbishop, who decided that "as regarded the vaulting and arches, the old design must be carried out, and not that of Mignot"; and that "as regarded the *pilone* of the churchyard, the foundations required to be strengthened." The chapter agreed with the archbishop on the first point; but on the second they were favourable rather to Mignot, and the demolition of the *pilone*. The old design triumphed; on 15th October in the same year, the name of Mignot was erased from the roll of architects, and

he was compelled to make good the cost of pulling down the work executed during the two years of his superintendence.

GIULINI, *Memorie*, 4to., Milan, 1760-71, xi., 452-62; FRANCHETTI, *Storia*, 4to., Milan, 1821; GWILT, *Encycl.*, edit. by PAPWORTH, 1867, pp. 259, 906.

MIGUEL DE AGUERO (JUAN), see AGUERO (J. M. DE).

MIHRAB, see MEHRAB.

MIKHAELOV (.....), designed the church of S. Catherine Vassili Ostrov at S. Petersburg; it has a dome and a Corinthian hexastyle portico. 14.

MILANO. (Latin *Mediolanum Insubrium*; Engl. and Fr. *Milan*; Ger. *Mailand*.) The chief town of the province of the same name, and of Lombardy in Italy. It is situated in the midst of a vast plain, but it is brought by canals cut in the twelfth and fifteenth centuries into communication with the lakes Maggiore and Como, and with the rivers Adda, Ticino, and Po. Under the emperor Gratian (d. 383) it was considered the sixth powerful town in the Roman dominions, and is thus mentioned by ANSONIUS towards the close of the fourth century. PROCOPIUS, some 150 years after, speaks of it as inferior only to Rome. In Virgil's time it was the Athens of Northern Italy. At the end of the third century Maximilianus, the colleague of Diocletian, founded his court here as emperor of the West, and surrounded the city with walls two miles in circumference, and erected numerous edifices; GIBBON, *Decline*, etc., ch. 13. The present city dates from the rebuilding after its destruction by Frederick I., 1162, and many of the present buildings still bear marks of their former importance as domestic fortresses. The works commenced 1865 for extensive improvements around the cathedral are detailed in *BUILDING NEWS Journal*, 1865, xii, 197.

The sites of thermæ and temples are known; the colonnade of S. Lorenzo, near the church of the same name, is the most perfect of the remains; it consists of sixteen fluted columns presumed to be a portion of a Corinthian temple to Hercules, built by Maximian; others consider they formed part of the baths of Hercules; they are assigned to the third century. AMATI, *Sedici antiche colonne*, fol., 1831. GUILLON, *Descr. sulle colonne di S. Lorenzo*, 8vo., 1812. AMATI, *Antichità presso S. Lorenzo*, 4 pl., fol., 1821; and *Succinte Memorie*, 4to., 1831. CASTIGLIONE, *Mediol. Antiq.*, 1625. AMATI, *Antiq. di M.*, 4to., 1747. FUMAGALLI, *Antichità Longobardico-Milanesi*, etc., 4 vols., 4to., 1791-4.

Among the thirteen gates the following are worth notice:—The porta Romana, 1598, by M. Bassi (CASSINA); Tosa or a Torta Tosa, or Tonsa (CESARIANO, p. 87), now also Vittoria; Nuova, 1810-12, by Zancoja; Ticinese or di Marengo (Ionic propylæum) 1815 by L. Cagnola; Comisina or Garibaldi 1826-28 by G. Moraglia (CASSINA); Orientale or di Venezia 1828 by Vantini or Piermarini; Principe Umberto 1865; Vercellina or di Magenta by Canonica; del Sempione or *arco della Pace* first erected as a model in wood and canvas in 1806 by L. Cagnola at the porta Orientale; and commenced in white marble in its present position 1807, resumed in 1816, and completed by C. Londinio 1833-38; some of the ornaments are by G. Albertolli. VOGHERA, *Illustr. dell' arco*, fol., 1838; KNIGHT, *English Cycl.*, 8vo., 1855, iii, Geog., p. 811; BIBL. ITALIANA, 1828, vol. 1, p. 3. ALLGEMEINE BAUZEITUNG *Journal*, 1839, pl. 287; and PENNY CYCLOPEDIA.

The cathedral or *duomo*, belonging to the Ambrosians and sometimes called the basilica of S. Ambrosio, dedicated to Sta. Maria, is the successor of three buildings on its site. VASARI, in his life of Niccolò Pisani (1207-78), notices that many Lombards and Germans had assembled for the construction of the cathedral, but who were dispersed over all Italy by the hostilities between the Milanese and the emperor Frederick. It was commenced under the grand duke Giovanni Galeazzo Visconti, 15 March 1386, but had been begun 23 May 1385; the works were destroyed, and really recommenced 7 May 1387, as stated by Simone da Orsenigo, who was employed as chief architect

(*inzierius*) as early as 6 Dec. of that year; he was dismissed, and the design then made is attributed to Marco and Jacopo da Campione (the name of a village between the lakes of Lugano and Como). Marco appears 1387 in the records, and is supposed to be the Marco da Frisone who was buried 8 July 1390 with great honours. Jacopo, who appears 20 March 1388, died 1398. The subsequent architects for a time were chiefly German and French, whose designs met with great opposition from those superintending the works, but the wardens appear to have desired to act for the best. The following names are those to whom certain works are attributed: many others, as Bramante, etc., were also consulted. Heinrich Ahrlar, called Enrico di Gamodia or Gmünden, or Zamodia, has been considered the chief architect, but he appears only towards the end of 1391; he upheld the quadrangular system of proportion. Orsenigo was recalled, and ordered Nov. 9, 1390 to return his drawings. Campamosia of Normandy 1391 built the great east window from the designs of N. Bonaventura of Paris 6 July 1388, but being dismissed July 31, 1391, was succeeded by Giovanni Annes or Annex di Fernach 12 March 1391, whose design for the sacristy was approved and carried out by Grassi 1399. To him succeeded Ulrich von Füssingen of Ulm, who was paid off 1394; then Jean Mignot of Paris 1399, who was also dismissed 1401 (see G. della CROCE). The capitals of the nave and choir are stated to have been done 1500 by Filippino da Modena, but they were executed in 1400 (FRANCHETTI), perhaps by Mignot. The Onodet, father and son, April 1490-1522 erected the *tribuna* and completed the cupola; the spire was added by F. Croce in 1760. Cesare Cesariano 1491 is considered by some to have finished the present interior; he published in his translation of VITRUVIUS 1521 three plates of the triangular system of design (reproduced in HAWKINS, *Hist. of Gothic Arch.*, 8vo., Lond., 1813): the five interior doorways were by F. Mangoni 1548. The whole church was consecrated 1577 by S. Carlo Borromeo (some writers say 1418 by pope Martin V). The windows in the nave, the pavement, the baptistery in north aisle, the choir, and perhaps the chapel beneath 1584, are by P. Pellegrini, who left in 1587, being succeeded by M. Bassi, who is said to have designed the large gothic chapel of the Virgin; he died 1591, but the design for the lower church was made by G. Malejo, and handed 1605 to the capomaestro F. Laurenzio for his guidance. The three west divisions of the nave being an addition, were vaulted 1651-69. Many designs were made for the west front; one by P. Pellegrini was selected 1560; 1646 C. Buzzi proposed a Gothic design, keeping the doors and windows as executed, which was continued 1659 by F. Castelli, and later by F. Ricchino; L. Pollak succeeded to the works 1803-6; and it was completed 1806-13 by C. Amati. P. Pestagalli succeeded 1813 and died 1853, he is said to have designed the subterranean chapel of S. Carlo (but see *Descriz. della sontuosa capella detta lo scurolo di S. Carlo*, 12mo., 1751); the front was completed by him about 1848. He was the last of about 183 persons employed as architects on this building. Not until 1860 was another architect appointed in Giuseppe Vandoni. Since that period the works have steadily progressed, 7000 statues having been placed up to 1863; when 3000 more were said to be required to fill the pedestals, etc. The stalls of nutwood were carved by Richard Taurigny of France, (AICARD, *Patria*, p. 2148). The tinted glass 1400 was executed by artists from Venice and Normandy; 1438 by Milanese and Frenchmen; 1570 by Giovanni de' Bartoli of Milan who established a factory; the modern glass was commenced by G. Bertini of Milan (died 1849). Two monolithic columns of (red granite) migliarolo from Baveno, about 32 ft. high, are placed inside at the entrance.

This cathedral is one of the largest examples of the Pointed style in Italy, wholly terminated, and would have been the most complete, if the front had been finished in the same style, as intimated in the *Vitruvius* by CÆSARIANO, 1521. The pillars are like clustered columns 40 ft. high, with octagonal capitals formed of eight niches containing full-sized statues; the

church, and particularly the east end, is very dark. The plan consists of a nave and double aisles of nine bays, transepts with double aisles of three bays, the crossing surmounted by an octangular lantern; a choir of three bays and a broad apse, having three sides of a nonagon with a broad aisle, and sacristies to the north and south sides. There are no chapels, and originally there was only one altar. The tracery of the groined vaulting is painted and modern. The upper vaulting is said to be bound together by an iron chain. There is no triforium. The edifice is built of the white marble of Monte Candoglio or Candido, on the river Toce, a tributary of the Lago Maggiore, which was selected as better fitted to stand the atmosphere than Carrara marble, of which it is usually said to be built; the same marble is still used for the works, the quarry having been given to the fabric by G. G. Visconti at the commencement of the works (*SOCIETY OF ARTS' Journal*, 1860, p. 568). The interior length from east to west is about 490 ft.; the breadth 189 ft. 6 ins. (or 177 ft. 3 ins.). The transepts, with chapels at the extremities, 295 ft., or 288 ft. The nave is 279 ft. long, and 197 ft. (or 189 ft. 6 ins.) wide including the aisles, and 63 ft. wide between the centres of the pillars. The height of the vaulting is 153 ft. 6 ins. The apex of the façade is 170 ft. high; the central buttresses 195 ft.; the height to the Madonna's head on the spire is given as 355 ft., or nearly 361 ft., or 400 ft. All the turrets, buttresses, and pinnacles are surmounted by statues 6 ft. high. The very flat roofs are formed by slabs of marble fitted together with great exactness.

A model is still extant (though dilapidated) of the Gothic building intended to have been erected; but this was probably made 1519; for CÆSARIANO states, fol. 89b, that a model was burnt (*brusato*).

The vast size of the building, the exquisite beauty of the marble, the innumerable fine statues, which fill the hundreds of niches, render this one of the most remarkable sacred edifices in Europe. But the want of two western towers, the incongruous quasi-classical style of the west front, and the absence of a large uprising central tower or spire over the crux, detract from its dignity when seen from a distance; and even near, the want of culminating features is severely felt, and produces disappointment in the beholder.

GIULINI, *Memorie*, etc., 12 vols. (vol. xi relates to the duomo), 4to., Milan, 1760-71. FRANCHETTI, *Storia e descriz. del duomo*, 4to., Mil., 1824. *Il duomo di M., ossia descrizione storica critica di questo insigne tempio, e degli oggetti d'arte che lo adornano*, 4to.

Plans and views of the cathedral:—*Collezione di Stampe, pareri, lettere, e disegni per la facciata del duomo di Milano, pubblicate nella fine del secolo XVII; opera rarissima e interessantissima*, is quoted in Cicognara's catalogue. ROBB, *Eglises Principales de l'Europe*, fol., Milan, 1824-31. BOCCA, *La Metropolitana di Milano*, etc., 66 pl., fol., Mil., 1824. *Il duomo di Milano*, 60 pl., fol., Mil., 1863; and 1868. *La Facciata del duomo*, 5 fold. pl., 4to. ANDA, *La Metropolitana di M.*, 66 pl. of statues, etc., 4to., Mil., 1824. *Vedute e monumenti di cath. di M.*, 112 pl., 4to., Mil., 1820(?). *Duomo di Milano*, etc.; and transl. *Description de la cath. di M.*, etc., 65 pl., 4to., Mil., 1823. ARTARIA, *Il duomo di M.*, 63 pl., 4to., Mil., 1823. *Nuova descriz. del duomo*, pl., 8vo., Mil., 1820. *Relazione delle solenni esequie celebrate nel duomo a S. M. la reina di Sardegna Polissena Giov. Cristina*, pl., fol., Mil., 1735; and *Elisa C. M. Theresæ Augustæ Matri justa funebria*, pl., fol., Mil., 1751. NAVA, *Relazione dei restauri intrapresi nella gran guglia del duomo*, 4to., Mil., 1845.

A side elevation and the west front, two designs in the Italian style, are given in BLAU, *Nouv. Théâtre d'Italie*, fol., Amst., 1704, i. A view from north east, the plan and interior, are given in GALLY KNIGHT, *Eccles. Arch.*, fol., Lond., 1844, pl. 36 and 37. Interior doorway of sacristy in south aisle is given by NORMAN SHAW, *Sketches*, fol., Lond., 1858, pl. 53,

"in point of detail far surpassing any other portion of the cathedral." Plan in Bassi, *Dispareri*, 4to., Brescia, 1572; in Hope, *English Cath.*, 8vo., Lond., 1861; reprinted in *Builder's Journal*, xix, 675. GAILHABAUD, *Monuments*, 4to., Paris, 1852.

Among the seventy-nine churches the following are most noticeable.

- S. Agostino; a baptistery, said to date 358.
 S. Alessandro; rebuilt 1680-1692 by L. Binaghi; restored 1834.
 S. Ambrogio; erected by Archbishop Auspertus (868-881) on site of a Basilica founded by S. Ambrose; ded. 387; the *atrio* is of the former date. It is the most ancient mediæval building in the city. The atrium was restored 1631 by F. Ricchino, all the old features being preserved. A tower of the ninth century, with another dating 1143. Chapel of Sta. Marcellina is by L. Cagnola, cir. 1820. The *pala* (VIVOLINI MAGIST. PRABER is inscribed upon the back of it) was presented 830 by Archb. Angilbert II; his tomb 632; and tomb of Emperor Louis I, who died 875. Pulpit repaired 1201. CASSINA devotes 11 plates to this building. FERRARIO, *Monumenti delle Bas.*, 31 coloured pl., fol., Milan, 1821. *Illustrations*, s.v., Church plan. *Guida i monumenti antichi e moderni della Las. Amb.*, 8vo., Mil., 1837. Hope, *Architecture*, pl. 1 and 63. GRUNER, *Ornamental Art*, fol., Lond., 1850, pl. 26, gives inlaid roof of the church, 15th cent.; and pl. 60, painting of an archivolte by D. Luini. The interior, atrium, tabernacle, and high altar, are given in GALLY KNIGHT, *Eccles. Arch.*, fol., Lond., 1842-4, pl. 24-5-6. LANUS, *Intorno alcuni monumenti*, etc., nel 1813, 4to., 1824.
 S. Ambrogio, Monastery of, now a military hospital; built about 1465 by Bramante with its fine cloister, now destroyed. CASSINA gives the plans and the enriched refectory.
 Degli' Angeli; by V. Seregni.
 S. Antonio Abate; built 1632 from designs by F. Ricchino.
 S. Aquilino; a small octagonal chapel, perhaps ancient, but having modernized mosaics in the dome; an ancient tomb remains.
 S. Bernardino (desecrated); the chancel arch is perhaps Romanesque.
 S. Bernardino dei Morti; has a chapel entirely walled with skulls and bones symmetrically disposed.
 S. Carlo Borromeo; erected 1838 by C. Amati. The dome is second in size only to that of the Pantheon at Rome; it is 105 ft. diam., 120 ft. high, and with lantern 150 ft. AMATI, *Succinta descriz. della Corsia de' Serri*, etc., 4to., 1834.
 Sta. Caterina alla porta Ticinese, with the convent and façade, is attributed to G. Alessi, but is by Cristoforo il Lombardino, or C. Solari (VASARI, ed. Flor. xi, 273).
 S. Celso; founded 306; a door with capitals and symbolical ornaments of tenth century to the choir still remains (CASSINA); restored 1691; repaired 1777; the campanile is of brick.
 S. Eufemia; an ancient foundation, almost wholly modernised.
 S. Eustorgio of the Dominican order; dedicated 320. The crypt has some finely cut Pointed caps. Altered to present form cir. 1450 or later by T. Lombardino. Chapel of S. Dominic 1416. Chapel of S. Thomas end of 13th cent. Chapel of The Rosary 1733. Chapel of S. Pietro Martire 1400 by Pigello de Portinari, a Florentine. At north end of the façade is an external pulpit, supposed to date from beginning of 13th century. Campanile built between 1297 and 1309, and completed 1658 by F. Ricchino. Hope, *Arch.*, pl. 96, gives the south side and end of a chapel by Bramante. ALLEGHANZA, *Inscrip. Sepul. Basil.*, 4to., 1773.
 S. Fedele, on site of old church of Sta. Maria in Solariolo, by P. Pellegrini 1569, and completed 1579 by M. Bassi (in CASSINA); façade completed, and high altar designed 1821 by Pestagalli. *Soleni esequie celebrate in Milano* il 12 Dec. 1736, nella chiesa di S. Fidele per le morte del *Mur. D. Giorgio Clerici*, pl., fol., 1736.
 De' Gesuiti, by P. Pellegrini.
 S. Giorgio in Palazzo; was founded by San Natalis 750. The exterior restored 1800 by B. Ferrari; and the interior restored 1821 by L. Canonica; the altar is perhaps an ancient sarcophagus.
 S. Giovanni alla Conca (desecrated); a late Pointed west front of unfinished brick; a rose window.
 S. Gottardo; built 1336-39 by Francesco Pecorari of Cremona. The campanile is polygonal, of brick, with stone shafts to the lights, and an elaborate Pointed spire of brick.
 S. Lorenzo Maggiore; a basilica; fell down 1573. P. Pellegrini or G. Cucco gave designs 1574 for rebuilding it; succeeded by M. Bassi, who had finished it, except the dome, at his death 1590, when it was slightly varied; it is octagonal. FERRARI, *Dispareri*, etc., 4to., 1771.
 S. Marco; built 1254. The altar by G. Albertoli, cir. 1800.
 Sta. Maria in Brera; an inscription 1347 on the door of its erection by G. Balduccio of Pisa.
 Sta. Maria dei Carmine, or in Monte Carmel; over the west door is the date 1400, which may be the date of the shell. Altered to the Roman style 1680. Restored 1835-39 by F. Pizzagalli.
 Sta. Maria delle Grazie and Dominican monastery 1464-93, are by Bramante or by L. da Vinci. The nave, aisles, and side chapels are Pointed,

- of brick; the transepts, dome, and choir, are also of brick. GRUNER, *Lo Scoffato* or presses in the sacristy; illustrations of the painted decoration by B. Luini, 30 col. pl., fol., Lond., 1859-60. The west front is given in Hope, *Hist. of Arch.*, pl. 49a. The convent is now a cavalry barracks; in the refectory is the picture of the "Last Supper" by Leonardo da Vinci. GRUNER, *Ornamental Art*, External Enrichment, 15th century, fol., Lond., 1850, pl. 56. CASSINA, pl. 1-7. PISA, *Storia genuina del Cenacolo*, 8vo., 1796. Rossi, *Del Cenacolo*, fol., 1810. VERRI, *Ostervaz. sul vol. intit., "del cenacolo"*, 4to., 1812. *Illustrations*, Apse, 1854-55.
 Sta. Maria della Passione; built 1485. The cupola 1530 from designs by C. Solari il Gobbo; façade 1692. The plan is given in LECLERC, *Recueil*, fol., Paris, 1826, pl. 44.
 Sta. Maria della Vittoria, a fine work by F. Mangone (cir. 1650).
 Sta. Maria Polone; the pronaos is by F. Mangone (cir. 1650).
 Sta. Maria presso S. Celso, a collegiate church, has a brick Lombard tower at south east angle. The original church built 1429 for Filippo Maria Visconti; atrium or vestibule 1491 by Bramante. The front by Cristofano Solari il Gobbo. Completed 1565-72 as at present by M. Bassi, from designs of G. Alessi. O. Lunghi also worked there 1000. M. Bassi designed the altar of the Virgin under the cupola. The portico or vestibule was in existence 1520 (CESARIANO, p. 102b), and was destroyed when the church was reduced to a simple oratory; VASARI states the portico was finished by Solari after the death of its designer Angelo Siciliano or Angelo de Mania. DE PAGAVE insists that Angelo was the builder employed to execute Bramante's design 1491. *Descr. dell' opera a fresco eseguita nel 1795-dal pittore A. Appiani*, 8vo., 1803. *Notizie storiche intorno la miracolosa immagine ed insigne tempio della B.V.M. presso S. Celso*, 4to., 1763. A plan and section of the cortile are given in LECLERC, *Recueil*, fol., Paris, 1826, pl. 55. CASSINA gives plan and details.
 S. Maurizio, called also Monastero Maggiore. One of the two towers is traditionally stated to be a Roman tower of defence; one is round, the other square; there are also fragments of a Roman wall. The building is principally the work of Dolcebuono (1497-1506), a pupil or assistant of Bramante; a stone in the east wall is marked with a cross and "Lapis primarius" 1503. The façade is by Perovano 1563. A solid rood loft between nave and choir reaches to the cornice. Several large cloisters attached to the convent, with Pointed arches, are falling to decay. GRUNER, *Ornamental Art*, fol., Lond., 1850, pl. 57, gives a painted arch round a tabernacle; and pl. 58-9 portions of two painted ceilings. And in *Fresco Decorations*, fol., Lond., 1844, Pt. 2, pl. xi, the plan and coloured section of the church.
 S. Nazaro Maggiore, a basilica founded 352, burnt 1075, enlarged by San Carlo. Vestibule in front serving as chapel of the Trivulzi family (if later than 1618) was probably executed before 1573, but is not by Bramante as attributed; chapels were added 1633.
 S. Nazaro in Pietra Santa, rebuilt by G. Galliori, cir. 1773.
 S. Paolo, built before 1564; the side towards the piazzi by G. Alessi; the very large choir, blocked off from the nave by a solid rood screen, is now stripped; it contains remains of frescoes.
 S. Pietro in Gessate; choir 1640; monastery 1509. "Bramantesque".
 S. Pietro in Camminadella, a small late Italian building.
 S. Satiro. The chapel, formerly of Sta. Fausta, in the left hand transept, is all that remains of the original church 869, but considered of the fifth century. Present building or its interior dates about 1480, which with the sacristy are by Bramante (CESARIANO, p. 70b), or by Bramantino Il Suardi. No choir, but a perspective one painted on the wall of same date. Restored 1857. ANTESANI, *Raccolta di varie lettere*, etc., 8vo., 1810.
 S. Sebastiano; built 1674-77 by F. Mangone, from designs by P. Pellegrini.
 S. Sepolchro. Towers cir. 1031, one on each side of chancel; remainder of the church built cir. 1844 for cardinal Frederic.
 S. Simpliciano; erected for S. Ambrose; altered 1682.
 S. Stefano Maggiore is by Trezzi.
 S. Stephano in Brolio, a basilica; rebuilt by successor to S. Carlo Borromeo (died 1594); restored 1829. Chapel 1656; restored 1844. The campanile 1642. Plan given in LECLERC, *Recueil*, fol., Paris, 1826, pl. 31.
 S. Tommaso, in Terra mala or terra amara; built 1560; since much altered. Ionic portico 1825.
 S. Vittore al Corpo, the basilica Porziana; rebuilt 1566 by M. Bassi from designs by G. Alessi, a large and magnificent church. *Illustrations*, Ceiling, i, Part 1.
Raccolta dell' interno delle principali chiese, fol., 1820-3.
 MIGLIORI, *Raccolta delle migliori fabbriche, monumenti, etc.*, di Mil. e suoi dintorni, 4to., 1820-5. CASSINA, *Le fabbriche più cospicue*, fol., 1840-44. GRATIOLI, *De preclaris Mediolani Edificio*, 4to., 1734. RICERCATI, *Raccolta delle fabbriche*, etc., 4to., 1820.
 The original building of the palazzo della Corte, palazzo reale, or royal palace, was erected by Azzone Visconti about 1335;

restored 1573-80 by A. Piscina, and 1717 by G. Barbieri of Parma, but demolished except the church of S. Gottardo and its old tower, which are given in GRUNER, *Terra Cotta Arch.*, fol., Lond., 1865, pl. 5-6. The new palace was begun 1790 by Pollack, and continued by Vanvitelli with G. Piermarini; the back elevation is by Canonica and Tazzini; the throne room by A. Appiani, and decorations 1838 by Tazzini: CASSINA illustrates it; LAMBERTI, *Descr. de' dipinti a fresco del A. Appiani*, 1809. BISI AND GIRONI, *Pinacoteca del pal. reale*, 4to., Milan, 1812-23. Villa Reale, formerly palazzo or villa Belgiojoso 1790-93 by L. Pollack (CASSINA). Archbishop's palace, built by P. Pellegrini. Palazzo Broletto, or the town hall, built for Filippo Maria Visconti. Palazzo degli Archivi or della Ragione, begun 1228 by podestà Aliprandi; completed 1233 by Oldrado Grosso di Tresseno; façade given in HOPE, *Arch.*, pl. 56; in its piazza are the loggia degli Ossi 1316; and the scuola Palatina. Palazzo della Città 1564 by Napoleone della Torre, has a tower of 13th century. The exchange by Seregini; its entrance by G. Alessi. The custom house was built 1525; the palace of the tribune of criminal justice 1605 by V. Seregini, M. Bassi, or P. A. Barca (CASSINA); the penitentiary by F. Croce; the Monte or public bank by G. Piermarini.

The Brera was formerly the establishment of the order of Umiliati suppressed in 1570, the building was given to the Jesuits for public schools, and the academy of the fine arts. The great court is surrounded by two stories of arcades; the tower serves as an observatory. The library has over 100,000 volumes and MSS., a collection of casts, another of coins since 1803, and one of the best picture galleries in Italy, with 400 oil paintings. Ambrosian Library, built about 1618 by F. Mangone, is 127 ft. by 66 ft., and 74 ft. high (or in the range), and contains over 140,000 printed books, and 15,000 old and rare MSS. An interior is given in BURMANN, *Thes. Antiq. Italia*, ix. OPICELLI, *Mon. Bibl. Amb.*, 8vo., 1618; BORROMEO, *Mus. Bibl. Ambros.*, 1625. Collegio Longone ed Liceo di Porta nuova (CASSINA, 5 pl.). Seminario maggiore arcivescovile was founded 1570 in the house of the Umiliati, arranged by G. Meda (CASSINA, who also illustrates the following three edifices, all by F. Mangone); collegio Elvetico, now palazzo della contabilità generale, 1617-29, also attributed to Pellegrini; the Orfanotrofo della Stella; and La Canonica of S. Lorenzo, not yet completed.

Palazzo Belgiojoso 1777 by G. Piermarini. Pal. Visconti, remarkable for the series of large busts on the pediments to the first floor windows. Pal. Annoni 1631 by F. M. Ricchino (in CASSINA). Pal. Archinto 1833-7 by G. Besia (in CASSINA). Pal. Saporiti, formerly Belconi, now Bocca, 1812 by G. Perego, and carried out by J. Giusti (CASSINA). Pal. Borromeo (Gothic) 1444. Palazzo Marini duca di Torrenuova, and later Di Finanza, 1574 by G. Alessi, now public offices, is peculiar though picturesque. The interior of the palazzo Orsino is by L. Canonica, but not the palazzo Bellotti. Pal. Busca Serbelloni by Cantoni. Pal. di Cosimo Medici 1456; improved by M. Michelozzi for the duke of Milan (CASSINA, pl. 8 to 14); it afterwards passed to count Barbò, who sold it 1802 to Pizzoli, and was bought 1821 by Carlo Vismara. Pal. Erba-Odescalchi, now Pensa, by P. Pellegrini (CASSINA). Pal. Tommaso Marini, now excise office, 1555 by G. Alessi (CASSINA). Pal. Litta, by F. Ricchino. Pal. Melzi on the corso di Porto Nuova; the new façade by G. Albertolli cir. 1835, who designed saloons in several of the other palaces. Pal. Belloni, by L. Cagnola, before 1833. Pal. near the porta nuova, by F. Albertolli, before 1844. Casa Taverna, 1835-6 by Albertolli (CASSINA); portion of the elevation of the courtyard, and decorations of the portico of the same, by B. Luini, are given in pl. 75 and 76 of GRUNER, *Ornamental Art*, fol., Lond., 1850. Casa Melzi 1805 by G. Albertolli. Casa Canonica by L. Canonica. The following are illustrated in CASSINA: casa Bellotti 1819-21, and casa Passalacqua 1831 by

G. Crivelli; casa Cagnola 1823-5 by P. Pestagalli; casa Tarsis 1836-8 by L. Clerichetti; and casa Pianca, with large gardens; the front divided into three parts.

Ospedale Maggiore, the albergo de' poveri di Dio. The south portion begun 12 April 1457 by A. (Filarete) Averulino, whose design is given in CASSINA. The central portion 1621 by F. Mangone and F. Ricchino and C. Buzzi, who planned the great central quadrangle, and altering the capitals, availed themselves of an external portico executed by Bramante in the right wing. The north wing, which does not harmonise with the rest, is by F. Castelli, so that the building was completed before 1666. The elevation of one bay is given in BUILDER *Journal*, 1851, ix, 122; and in DALY, *Revue Générale*, 4to., Paris, 1843, iv, 358, pl. 13; and v, 528, pl. 28; and in *Illustrations*, Cornice (Brick) 1848-49, pl. 17; and Cortile 1856-57, Part ii. HUSSON, *Etude sur les hôpitaux*, 4to., Paris, 1862, pl. 14. Lazaretto, outside the porta orientale, founded 1461 by Ludovico (il Moro) Sforza, erected 1489-1507; DURAND, *Parallèle*, fol., Paris, 1801, pl. 30; LATAUDA, *Descriz.*, i, 213-7, ascribes the design to Bramante; P. Pellegrini has also been named, who certainly did the chapel attached to it. LAZARETTO.

The Circo or anfiteatro Diurno or della porta Vercellina, designed 1805-27, the gates 1831 by L. Canonica, will contain 30,000 to 36,000 spectators; while still incomplete in Napoleon's time, naumachiae were represented, the arena being filled with water. It is 780 ft. long, by 380 ft. 6 ins. wide. (CASSINA, pl. 15 to 21; SURVEYOR, etc., *Journal*, 1843, iv, 234-5. The theatres are as follows: "La Scala" 1774-79 by G. Piermarini; the interior decorations by G. Albertolli: it has six tiers of boxes and accommodation for 4,000 persons, and for 7,000 when arranged for a ball; L. Canonica improved the stage portion 1814; the orchestra accommodates 91 musicians; the proscenium is 40 ft. wide: *Il teatro della Scala del G. Piermarini*, fol., 1789: CONTANT ET FILIPPI, *Parallèle*, etc., fol., Paris, 1860: a number of measured drawings by H. Parke and J. Catherwood are in the library of the R.I.B.A.: *Descr. del nuovo Sipario dell' Imp. regio teatro*, fol., 1821. A plan of a theatre at Milan is given in DUMONT, *Parallèle*, fol., Paris, 1763. La Canobia 1780 by G. Piermarini, *Illustrations*, Ceiling, Part i, 1848-49. The three theatres called Carcano 1803, Ré 1812, and Fiando, are by L. Canonica; and the Filodrammatico by L. Pollack. Two new theatres were erecting 1863—Ristori's in the via del Giardino, and Gustavo Modena, near the porta Ticinese. The casino dei Nobili 1815 by L. Cagnola; the (merchants) casino della Società del Giardino, or palazzo Spinola, then Cusani until 1816; built 1591 by Pellegrini or V. Seregini (CASSINA).

In the environs is Chiaravalle, the church of the first Cistercian monastery in Italy built 1135 to near close of twelfth century; GALLY KNIGHT, *Eccles. Arch.*, fol., Lond., 1844, ii, pl. 4. FERGUSSON, *Handbook*, 8vo, Lond. 1867, gives the date 1221 for its erection. The elevation and section of the certosa, with the spire, are given in GRUNER, *Terra Cotta Arch.*, fol., Lond., 1855, pl. 3 and 4; who also illustrates the casa Arcimbaldi, near the city, in pl. 44. Between Nocera and Milan is a calvary, given in LECLERE, *Recueil*, fol., Paris, 1826, pl. 31. At Simonetta is the well known echo. DAL RE, *Ville di Delizia nello stato di M.*, 45 pl., vol. i only, 1743, or *Maisons de plaisance de l'état de M.*, fol., 1737. *Descriz. della villa Silva in Cinisello*, 8vo., Monza, 1811.

A plan of the city is given in the maps of the Society for the Diffusion of Useful Knowledge, No. 190. ARGELATI, *Bibliotheca Script. Mediolan.*, 1465-1500, 4 vols., fol., 1745. AMORETTI, *Guide des étrangers dans M.*, and *Viaggio di Mil.*, etc., 12mo., 1805. C. TORRE, *Il Ritratto di M.*, 6 pl., 4to., 1674; 2nd edit., 1714. GIULINI, *Memorie spettanti alla storia, etc., e della campagna di M.*, 12 vols., pl., 4to., 1760; and cont. 1771; new edit., 7 vols., 8vo., 1854-57. LATAUDA, *Descrizione di Milano*, 8vo., 1737-8. PIROVANO, *Nuova Guida*, 16mo.,

1824. *Album esposizione di belle arti di M.*, 5 vols., 4to., 1837-41. *Descrizione di Mil. ornata con molti disegni in rame delle fabbriche più cospicue*, 8vo., 1737. VERRI, *Storia di Mil.*, 12mo., n. d., and 2 vols. 4to., 1798. *Les Curiosités de la Ville*, 71 vues, 2 vols., 4to., n. d. *Annali universali di viaggi, etc.*, 29 vols., 8vo., 1824-31. ROSMINI, *Storia*. BORRONI, *Il Forrestiero in M.*, 8vo., 1808. ASPARI, 18 *Vedute principali di M.* ARTARIA, *Collection de 25 vues de M., etc.* ANTONINI, *Opera d'Arch.*, 24 pl., fol., 1814. TURCONI E DE CASTRO, *Italia Monumentale*, fol., Milan, 1870. *La pompa della solenne entrata—della Seren. Maria Anna Austriaca*, pl., fol., Mil., 1651. STREET, *Brick and Marble Arch.*, 8vo., Lond., 1855, p. 214. BUILDER *Journal*, "Going along", 1863-4, xxi, 905, giving the pinnacles of the cathedral, p. 912; xxii, 1.

Milanese furniture and building materials are noticed in BUILDING NEWS *Journal*, 24 Nov., 1871, p. 395.

MILANO (CARLO) or CARLO MILANESE, designed 1640 the church Gesù e Maria at the upper end of the via del Corso, near to the Piazza del Popolo, for Agostiniani Scalzi; the façade, due to Carlo Rainaldi, is given in FALDA, *Nuovo Splendore*, fol., Rome, 1686, iii, 8. LETAROUILLY, *Rome Moderne*, 4to., Paris, 1850, p. 549, iv, 14, gives the plan, which he praises for its good arrangement and proportion.

MILANO (GIOVANNI DA), modernised for king Joseph II (1765-90) the interior of the kirche der Italiener zu Maria Schnee at Vienna, which had been completed between 1805-30; Scheimpfeil being *baumeister* in 1810. During the restorations under Giovanni, one of the oldest and most beautiful specimens of carving in Vienna, namely the tombstone of one of the founders of the church, Blanka of France, wife of king Rudolph of Bohemia, disappeared and without a trace.

MILANO (LUCCHINO DA) commenced 1460 the sham western front to the cathedral at Como; earlier portions, sometimes called insertions (as the three doors in the richest Lombard style, whence the rest of the façade has been called Early Italian Gothic), may be presumed to be his work; and the remainder, of late Pointed character, belong to its completion 1487-1526 by T. Rodario. Illustration in GWILT, *Encycl.*, edit. 1867.

MILANO (RIGO, AMBROGIO, and CRISTOFORO, DA), commenced as *muratori*, for 1500 ducats, the church of S. Elena on the island of S. Elena at Venice 1418-27. SELVATICO, *Sulla Architet.*, 8vo., Venice, 1847, pp. 142-3, quoting CIGOGNARA, *Iscr. Ven.*, iii, 358. This Cristoforo may be the one mentioned in the inscription "Cristoforum muratorium de Mediolanum præclarissimum magistrum", and who erected 1442 the campanile (octagon on plan) to the cathedral at Udine. MANIAGO *Guida*, 8vo., San Vito, 1840, pp. 33, 77.

MILE (Latin *miliare*, the *mille passus* or thousand paces of the Romans). The Act 35th Eliz., 1592-3, stated that persons were forbidden to build within three miles of London, and the mile is incidentally defined as to be 8 furlongs of 40 perches of 16½ ft. each, being 1760 yards. An Irish mile is 2240 such yards. A Scotch mile 1984 yards. An English square mile is 1760 yards each way, containing 640 acres. The metrical mile of 1,000 French mètres or one kilometre, or 1,093 English yards, is in use on the continent. The geographical mile, or the sixtieth of a degree of latitude, or about 2,025 yards, is used in England and Italy. Miles of greater length than 1,760 yards were undoubtedly used further from London; and also by old writers, as Bacon, Bernard, Greaves, and others, even up to 5,000 ft. PENNY CYCLOPEDIA, s.v. League and Mile, goes carefully into the question of length, giving a table from KELLY, *Cambist*, of the lengths in use in foreign countries. MEASURE.

MILESTONE. It is stated in a *History of Cambridge*, 1763, that "Dr. Harvey formerly caused a fine road to be made to Foulmire, nine miles on the way to London, which is since greatly improved by a turnpike erected at Hawkeston; and the milestones on this road (now become so common in other roads)

were the first that ever were in England." The milestones in England in the first half of the present century had their starting point from Cornhill, Whitehall, Hyde Park Corner, and other places. The Post Office radius has its centre now from St. Martin's-le-Grand. MILIARY PILLAR.

In the Prussian dominions the distances are reckoned by *meylens*, each of which is to an English mile as 1:5 $\frac{1}{3}$, and two such miles are considered a *poste*. The manner in which these distances are marked is twofold. From near Aix, on the frontiers of Prussia, the miles are marked on a lofty quadrilateral stone pyramid bearing the number of miles from Cologne, surmounted by the Prussian eagle; between these are three large stones like an inverted bell, dividing the space equally and marked, while each of the four intervals is again subdivided into fifty smaller spaces, distinguished by small cubical stones with the total number of such smaller intervals inscribed, each being equal to the two hundredth part of a mile. The second mode is observed between Juliers and Cologne; it consists of lofty milestones placed at the proper distance, the spaces between which are divided into four equal parts by differently shaped stones, and the latter intervals again subdivided into ten, by still smaller square stones; a number is marked in black figures on the two opposite surfaces, at right angles to the road: GRANVILLE, *Guide to St. Petersburg*, 8vo., Lond., 1835, i, 104. The road from Berlin is marked by large and small white stone obelisks, on the former of which the whole distance is marked, and on the latter the quarterly divisions; on the opposite side of the road, the whole distance of each mile is subdivided by 100 small cubic stones (p. 334). These minute subdivisions are necessitated for apportioning the lengths of roadway to be kept in repair by the local proprietors or authorities.

MILETO. A town in the province of Calabria Ultra II, in the former kingdom of Naples. The ancient site was abandoned, after two tremendous earthquakes in February and March 1783, for a new site situated about one and a half miles distant, and about eighteen miles from Palmi. On the ancient site are the ruins of the abbey of the Holy Trinity, the fragments proving that portions of ancient Roman buildings had been employed in its construction. In this church were two ancient sarcophagi in which were buried Roger, count of Sicily (died 1101, aged 70 years), and his first wife Eremberga. The smaller one, ornamented by the battle of the Amazons, with the lid of the larger one, was removed to new Mileto; the larger one remains on the site of the abbey. There are also ruins of the chapel of S. Martin, also built by him, and in which one of his sons was buried; and those of the bishop's palace, originally the castle of the count: the cathedral is entirely gone; GALLY KNIGHT, *Normans in Sicily*, 8vo., Lond., 1838, pp. 189-194. VITO CAPALBI, *Memorie della chiesa di M.* The columns of the temple to Proserpine near Hipponium or Vibo, were carried off in the eleventh century by count Roger to adorn the cathedral.

MILETUS, see DAPHNIS, HIPPODAMAS, ISIDORUS, and JOANNES.

MILETUS. Once the most flourishing city of Ionia, in Asia Minor, now Asiatic Turkey, and covered by a swamp formed by the deposits at the mouth of the river Mæander; it is situated about thirty miles southward of Ephesus, and not far from Priene. It was formerly equally celebrated for its magnitude, its extensive commerce, and the numerous colonies it sent out. The remains of a vast theatre, 224 ft. interior and 472 ft. exterior, diam. (SOCIETY OF DILETTANTI, fol., Lond., 1797, ii, pl. 46-7); of a Christian church formed out of a Greek temple of the Corinthian order; and of a fine mosque built of the ruins of Christian churches, still remain in a village of a few huts. An aqueduct may also be traced, and the site of several temples. Excavations are now (1875) being carried on, and remarkable remains have been brought to light.

The ruins of the celebrated temple to Apollo are situated 180 stadia south west of Miletus, at a modern village called Jeronta; see BRANCHIDÆ and DIDYMÆ. Further illustrations are given in TEXIER, *Asie Mineure*, fol., Paris, 1839-49, pl. 136-141. CHOISEUL GOUFFIER, *Voy. Pitt. de la Grèce, etc.*, 8vo. and fol., Paris, 1842, 2nd edit., i, 289, pl. 113-5.

MILIARY PILLAR. At the end of each *mille passus* or mile, consisting of 1,000 paces of 5 ft. each, the Romans erected a miliary column or milestone (*miliarium*) with an inscription indicating the distance from the next town. They usually consisted of a large plain cylinder of stone, raised on a base; and the inscription stated the name of the emperor under whose reign it was erected, so that they were probably often changed in order to honour a new emperor's name. The only perfect example known in this country is one in the museum at Leicester, set up under Hadrian: it is a perfect cylinder, 3 ft. 6 ins. high, and 5 ft. 7 in. in circumference; and was dug up in 1771. At Caton, near Lancaster, is another stone. They have been found more numerous in Gaul; one found near Vic-sur-Aisne was raised under Caracalla 212, seven leagues from Soissons, showing that in Gaul as in modern France the Romans reckoned by leagues, and not by miles as they did in Britain. D'ANVILLE reckoned the Roman mile at 756 French toises, or 4,834.28 Engl. ft. The English mile is 5,280 ft. WRIGHT, *Celts, etc.*, 8vo., Lond., 1861, 2nd edit., pp. 185-6. SMITH, *Dict. of Antiq.*, says, taking the Roman foot at 11.6496 Engl. ins., the Roman mile would be 1,618 Engl. yards, or 142 yards less than the English statute mile. The Roman mile contained 8 Greek stadia. The "London Stone" is supposed to be the remains of a Roman *miliarium aureum*. In the balustrade in front of the capitol, or more properly the piazza del Campidoglio, at Rome, is the first milestone of the Appian way, the inscription wonderfully perfect, its age being U.C. 441. A representation of the miliary column at Brindisi is given in CUCINIELLO, *Viaggio*, fol., Naples, n. d. ii, 95; it is 57 palms high, the shaft of "bigio orientale" marble, the pedestal of white marble, with a capital formed of twelve half figures; the pedestal of another one adjoining also exists. These two columns marked the termination of the via Appia. BERGIER, *Histoire des grands chemins de l'empire Romain*, 4to. Brux., 1736. DE CAUMONT, *Abécédairé, Ere Gallo-Romaine*, 8vo., Paris, 1862, p. 32. Canina estimated the Roman mile at 1481.75 mètres, equal to 4861.473 English feet. It is stated in some works as equal to 4834.28 feet. 2. 19. 78.

For details respecting extant mile stones, see "Miliarium" in the *Real-Encyclop. der Class. Alterthum*.

MILITARY ARCHITECTURE. That particular manner of building employed in constructing a fortress, or fortifying town walls. This subject, as exemplified during the middle ages, has been ably treated in DALY, *Revue Générale*, 4to., Paris, 1843, iv, 397, 385, and 433; and by VIOLET LE DUC, first in his *Dictionnaire*, and then in *Essai sur l'architecture militaire au moyen âge*, 8vo., Paris, 1854; which was translated by MACDERMOTT, with notices by HARTSHORNE of English examples, 8vo., Lond., 1859.

To the many publications noticed s.v. CASTLE, can now be added SOCIETY OF ANTIQUARIES, *Velutæ Monumenta*, i and iii; HARTSHORNE, *The Military Architecture of Great Britain*, paper read at Royal Inst. of Brit. Architects, *Sessional Papers*, 1850; CIVIL ENGINEER, etc., *Journal*, xiii, 218. An outline of a history is given in GWILT, *Encyc.*, probably taken from DALLAWAY, *Military Arch.*, in his *Discourses*, 8vo., London, 1806; and 1833, p. 267. G. T. ROBINSON, *The Military Architecture of the Middle Ages*, as illustrated by Kenilworth, Warwick, and Maxtoke castles, 8vo., Lond., 1859. A description and list of *English Castles*, with an alphabetical list of royal licences to crenellate, or fortify, granted between the years 42 Hen. III. and 19 Edward IV, 1256-1478, are given in GODWIN, *English Archaeologist's Handbook*, 8vo., Lond., 1867, pp. 181-251. Another list is given in TURNER and PARKER,

Domestic Arch., 8vo., Lond., 1859, iii, 401-22. FORTIFICATION; FORTRESS; KEEP, etc. *Illustrations*, Gateway.

San Michele designed some very fine fortified gates at the entrance of some towns in Italy, as illustrated in the publication by ALBERTOLLI, 1815, and by RONZANI and LUCIOLI, 1832. The fortress towns of the continent have gates as fine architectural features (*Illustrations, s.v.*, Entrance Gate and Gate House), and even at Portsmouth in England. MANDAR, *Arch. des Fortresses*, 8vo., Paris, 1801. BELIDOR, *La Science des Ingénieurs, etc.*, 4to., Paris, 1729; new edit. by NAVIER, 1814. MARCHI, *Della Architettura Militare*, fol., Bresc., 1599. PASLEY, *Course of Elementary Fortification*, 2 vols., 8vo., Lond., 1822. *Les Ordres Militaires*, 8vo., Amsterdam, 1721.

MILITARY HOSPITAL, see HOSPITAL.

MILITIA DEPOT. The building in the City Road, London, erected 1857 by Jos. Jennings, for the purposes of the Royal London Militia, contains on the top floor, the infirmary, etc.; on second floor, rooms for the non-commissioned officers and their families; on the first floor, twelve rooms and mess room for the same officers, adjutant's quarters, commanding officer's quarters, officers' mess room, reading room, lavatory, etc.; on the ground story, the guard rooms, armouries, adjutant's office, waiting rooms, room for examining recruits, serjeant major's quarters, and officers' stables. The basement contains the kitchens, lavatories, washhouses, and other accommodation for the militia when called out for training. A plan and view are given in *BUILDER Journal*, 1857, xv, 338.

MILIZIA (FRANCESCO), of a noble and wealthy family, was born 1725 at Oria, in the province of Otranto. At nine years of age he was taken to Padua, where he remained seven years, and then joined his father at Rome, who sent him to Naples to study logic and metaphysics under Genovesi, and physics and geometry under Orlandi. Having married, and obtaining an independence on the death of his father, he went to Rome, where he settled in 1761. He began to study architecture; and published his *Memorie degli Architetti più celebri*, 8vo., Rome, 1768; 3rd edit. Parma, 1781; Bassano 1785; translated by Mrs. E. Cresy, 8vo., London, 1826, with a few additional lives. A few other treatises followed, and then *Del Teatro*, 1772, which excited so much scandal from certain observations in it, that this edition was suppressed, but was republished later at Venice. The *Principi d'Architettura Civile*, 3 vols., 34 plates, 8vo., Rome, 1781, was greatly improved in the third edition, Bassano 1785 (with others of 1804, 1813, and 1832; and a *Indice delle figure*, 8vo., Rome, 1800); this work extended his literary reputation, but perhaps he attacked authorities too much, and propounded his own views without regard to others. His *Dell' arte di vedere nelle belle arti del disegno*, 8vo., 1781, and Genova, 1786, advocates Mengs and impugned Michael Angelo among others; *Roma nelle belle arti del disegno*, part 1, *dell' Arch. Civile*, 8vo., Bassano, 1787, the two other parts being suppressed on account of the attacks upon it; and *Dizionario delle belle arti del disegno*, 2 vols., 8vo., Bassano, 1797, is chiefly a translation from the *Encyclopédie Méthodique*. He then abandoned the fine arts, taking up the study of natural history and other subjects, of which he published several translations, etc. He died at Rome in March 1798. His works were republished, *Opere*, 8 vols., 8vo., Bologna, 1826-8. He wrote an autobiography in the 2nd edit. of his *Principi*.

Notizie di F.M., scritto da lui medesimo: Con un catalogo delle sue opere, 8vo., Venice, 1804. 14.

For a short time Milizia held the appointment of superintendent of the buildings in the Ecclesiastical States belonging to the king of the Two Sicilies, but he resigned it in 1786, not caring to have any such responsibility or tie upon him. His *Lettere inedite* addressed to count Sangiovanni and first published in Paris 1837, serve to portray his disposition, and feelings for art and persons.

MILK ROOM, see DAIRY.

MILL. In its original sense, this word meant a machine for reducing material to powder, and now in extended meaning for tearing, mixing, etc. In further signification it has become applied to factories, etc., in which, strictly speaking, other than these operations are carried on. The buildings are generally designated by the motive power, as windmill, horse-mill, water-mill, etc.; or by the material for which it is employed. Among the numerous compounds and uses of the term mill, are: Fulling mill, the action of which is to raise and let fall wooden or other weights in quick succession, as used in cloth manufacture, and cleansing. This mechanical use of power was, as one may imagine, unknown in early ages, as a painting upon the walls of the Fullonica at Pompeii, represents this work as being performed by slaves jumping up and down in tubs. Bark mill, used for chopping, grinding, and pounding bark and similar substances. Gunpowder and mortar mill, used for mixing various ingredients, gives another application of the power; saw, cotton, paper, woollen, silk, flax, oil, and other mills, are well known applications of the term. Flour mills for grinding wheat will be noticed under **WATER**, and **WIND**, *ILL.*

It is only of late years, consequent on the rapid introduction of steam power for all motive purposes, that mills and factories, as cotton mills and such like, have assumed any pretensions to architectural character; but the change from one small building or groups of buildings, each with its own grinding stones and motive power, was inevitable when a much greater force was introduced, which though condensed, and originating, as it were, in one point, the boiler, was by the means of the increased mechanical appliances it called into existence, readily capable of being disseminated up, down, or in any other direction, as the requirements of the work necessitated.

The first great change was to carry on all the various processes side by side, so that the material entered at one end of the building in its raw state, and was delivered at the other in its manufactured condition. This, however, was in the case of large factories found to occupy a far too great amount of ground space, and then processes were placed one over another, and the force of gravity called into play to help their continuity, lifts being used to raise the material as often as the work needed it.

For the first class of buildings, those with what is termed a "saw-tooth" roof were most employed, as giving the greatest possible amount of light to the interior, the valleys being supported by columns. This arrangement was, however, no longer possible when story was placed over story, and therefore the new type succeeded in long narrow buildings, in which the window surface almost, if not quite, equals that of the wall space. As yet both were devoid of any artistic treatment, the latter resembling nothing so much as a brick box with a roof, and many holes in the sides. This form, though the outline and requirements are still almost identically the same, has, during the last fifty years, under the hands of numerous architects, been gradually made to assume less severity of treatment, until the factories of this country now in very many cases vie with other public buildings as works of art. Before the inventions of Arkwright and Crompton, probably no cotton mill on a large scale was in existence, the work being carried on with other avocations in farm-houses and amongst the labouring poor. Sir Wm. FAIRBAIRN, *Treatise on Mills and Mill Work*, (Part 1, 8vo., Lond., 1871, 3rd edit.; and Part 2, 8vo., 1865, 2nd edit., reviewed in *BUILDER Journal*, xxi, 823) is full of information upon the mechanical requirements of the subject, and gives plans and sections of several distinguished examples at Constantinople and Taganrog, of various kinds and sizes, with some explanation of the machinery; he also gives a description of iron buildings for mill purposes. A description of mills, etc., on latest principles will also be found in BLACKIE, *Engineer and Mechanic's Assistant*, 8vo., Lond., 1862; and in BARLOW, *Millwork*, 8vo., Lond., 1841.

In arranging buildings for this purpose, there is perhaps no

better course for an architect to pursue than to place himself in communication with those who will have the practical carrying out of the operations for which the building they may have in hand is destined; for it is very evident that the misplacement of any room or process, no matter how trifling, may cost the employer of some hundreds of hands a large sum in the course of a year by the loss of time it occasions.

R. E. P.

FAIRBAIRN, *Application of Iron to Building purposes*, 8vo., Lond., 1857-8, p. 165, gives a plan and details of *The Saltaire Mills*, Shipley, near Bradford; also given in *BUILDER Journal*, 1854, xii, 437; *ILLUSTRATED LONDON NEWS*, xxiii, 288; the front is 545 ft. long; the combing room 210 ft. by 112 ft. An iron flax mill at Leeds, 1841, 396 ft. long and 216 ft. wide, is described in the *INSTITUTION OF CIVIL ENGINEERS, Minutes*, 8vo., Lond., 1842, i, 142.

Dean Mills, between Bolton and Manchester, contains a doubling mill, the then largest in the kingdom, containing 70,000 spindles; the views are given in *ILLUSTRATED LONDON NEWS Journal*, Oct. 1851, xix, 523. The Pacific Cotton Mill at Lawrence, Mass., U.S., has a floor surface of 16 acres; *BUILDER Journal*, 1855, xiii, 11. The mode of warming cotton mills is given in *URE, Dict.*, 8vo., Lond., 1853, i, 505, 4th edit. One at Bolton, *BUILDER Journal*, xv, 68. One at La Foudre by Fairbairn, is described in TURGAN, *Les Grandes Usines de France*, 1863.

The following references are to the failures of certain mills—Beer's Lodge, Belfast, 10 Jan. 1851, *BUILDER Journal*, ix, 115. Bunker's Hill, Colne, during a gale; it was 75 ft. by 46 ft. and 3 stories high. Pemberton Mill, Lawrence, United States, *BUILDER Journal*, 1860, xviii, 100. Salford Mills, Manchester, 1824, in GILL, *Technical Repository*, 8vo., Lond., 1822-7, vi, 319. Oldham Mill, Special Commission Report, fol., Lond., 1845.

MILLED LEAD, see **LEAD**.

MILL HOUSE. A term more especially connected with a **WATER MILL**, as being the instance in which more often both mill and miller's residence are combined in one building, together with provision for receiving and storing corn both before and after it is ground. The windmill is, as a rule, a smaller establishment, and from its nature forms a distinct building, having a separate house or cottage for the miller and his employees.

R. E. P.

MILLIARY PILLAR, see **MILIARY PILLAR**.

MILLS (.....), whilst clerk of the works 1666 to the corporation of the city of London, allowed E. Jerman, another surveyor to the city, to be employed for rebuilding the royal exchange. Mills, E. Jerman, and Oliver, were chosen surveyors by the city for rebuilding London after the fire, the rights of Mills being reserved, as already noticed *s.v.* JERMAN. *TITE, Proceedings*, paper read at Inst. of Brit. Archts., December 1845, and printed in *BUILDER Journal*, 1846, iv, 2; see also iii, 582.

MILLS (ROBERT). A native of Charleston, South Carolina, was educated at the college of that city. In 1800 he was sent by his father to Washington, and entered the office of James Hoban, architect of the public buildings then erecting in that city. After two years he travelled to all the chief cities and towns in the United States; and on his return was introduced to president Jefferson, who lent him Palladio's works and others on architecture; Mills made for him the plans and elevation of his proposed mansion at Monticello, the president reserving the details to himself, which he drew with minuteness, introducing every order of architecture in the finish of the various rooms (the president also designed and superintended the university buildings in Virginia). At Charleston, Mills designed the Congregational church, 90 ft. diam. inside, covered with a dome of the same span, the first attempt in that country; submitted designs for a penitentiary to the governor of the state; and shared in the premium given by the legislature of South Carolina for the best design for a new college, built 1804 in Columbia.

Returning to Washington, Mills was introduced by the president to B. H. B. Latrobe (then recently appointed architect to the capitol), into whose office he entered as pupil, where he studied engineering, and was transferred to the state of Delaware for the formation of a canal. This being abandoned for want of funds, Mills removed to Philadelphia, where he designed several buildings, among which was the bank of Philadelphia, a Gothic structure, the first attempt of that style in the States; the Washington Hall, afterwards burnt; the Baptist church, Sansom Street, for 4,000 persons, the best speaking and hearing room for its size in the States; the fire-proof wings of the State house for the public records; the timber-bridge 1813 near the waterworks, over the river Schuylkill, the largest span in the world, being about 340 ft. on the chord line; all the timbers were sawn through the heart, and kept separated by iron plates, thus, as was supposed, securing it from dry rot (it is usually attributed to Louis Wernwag, and was burnt 1838). Mills was one of the first promoters of the Society of Artists in Philadelphia, and acted as secretary while he remained there.

The court house at Richmond, as well as several private houses in that city; and the Burlington county prison, New Jersey, on a fire-proof plan, were designed by Mills, who also obtained, after the close of the war, the premium of \$500 for the best design of a monument to Washington at BALTIMORE, to which city he removed 1817, and prosecuted the work to its completion; he was soon after appointed president and engineer to the water company, and projected and executed many works of improvement connected with that city; such as the Baptist church, 80 ft. diam., surmounted by a dome; and St. John's church; and obtained one of the premiums for the State House to be erected at Harrisburg, Pennsylvania. In 1819 he published a work on the internal improvements in Maryland. In 1820 he removed to South Carolina, where he was appointed one of the acting commissioners of the board of public works, and engineer and architect to the State, for which he designed and had executed a number of public buildings for court houses, prisons, record offices, etc., all upon the fire-proof plan. Also the Lunatic asylum at Columbia, a very spacious and costly building, entirely fire-proof. His plan for a penitentiary at New Orleans was accepted in a competition of \$300, and the principles adopted in other similar erections. He published a work on the practicability and advantages of a continuous canal from Columbia to Charleston; he also directed the attention of the citizens of South Carolina to the improvement of their rich swamp land. Among the buildings at Charleston designed by Mills are the fire-proof offices for the public records; a fire-proof magazine upon a new plan of dividing the powder among several buildings, and a fire-proof prison wing; and the Baptist church. While in South Carolina he undertook and completed the *Atlas of the State of S.C.*, from actual survey, 28 pl., on a scale of two miles to the inch, fol. 1826; with the *Statistics of the State* as an appendix, 8vo., 1826.

During the visit of Gen. Lafayette, Mills assisted to lay the corner stone of the monuments dedicated to de Kalb erected in Camden, near the Presbyterian church, also designed by him. While at Baltimore at this period, he published several papers upon the importance of securing the trade with the Susquehanna river, by the construction of a railroad between Baltimore and York haven; and on his return to South Carolina, he suggested the railroad from Charleston to Hamburg and on to Columbia, part of which was executed; and published *American Pharos, or Light House Guide*, 8vo., 1832. The Bunker Hill (near Boston) monument committee having invited plans for a monument, Mills sent a design for an obelisk 221 feet high, 31 feet square, the first stone of which was laid June 17th, 1825, and was completed in 1842. Great complaints being made of the acoustic properties of the Hall of Representatives at Washington, Mills proposed a plan for remedying

the evils, and went into a scientific examination of the defects and remedies; the alterations were carried out, and acknowledged to be a decided improvement. Mills was then 1834 engaged in the service of the general government at Washington. DUNLAP, *Arts of Design*, 8vo., New York, 1834, ii, 221-26. He wrote *Guide to the national executive offices at Washington*, 1842, in which city he died, 3rd March, 1855; but his works between 1834-55 are unknown to the writer.

MILLSTONE-GRIT. The title of a remarkable group of strata, affording good building stone, which belongs to the carboniferous system, and separates the coal formation from the mountain limestone. Instead of the deposits of mountain limestone generated by processes almost purely marine, this group evidences that streams from the interior of elevated lands and periodical currents, spread pebbles, sand, and clay, with land plants, over surfaces where previously corals and shells were accumulated in the quiet sea. In Derbyshire it acquires great thickness. Farther to the north, the millstone-grit rocks appear on the summit of Ingleborough, Penygvent, and Wharnside, mixed with shales, limestones, ironstones and beds of coal. At least three distinct bands of coarse pebbly millstone-grit here occur, though not in one hill, and a similar character belongs to the series in Durham and Northumberland. Through all the extreme north of England, indeed, the millstone-grit group passes by its coal, ironstone, etc., to the coal formation above, and by its limestones and peculiar shales to the mountain limestone below, by so easy a gradation that the whole appears one vast series of associated deposits. The rock from which the group is named is a very coarse-grained quartzose sandstone, with layers of pebbles, often defining the upper or under surfaces of beds, and sometimes containing remarkable masses of laminated mica. Possibly the true history of the rock is, that it is a reaggregated mass of the disintegrated materials of granite. **ATMOSPHERIC INFLUENCE; CONGLOMERATE.** 14.

It has been noticed that the Saxons in the north of England used the coarse and durable millstone-grit, which, on the brows of the high mountains of Derbyshire and Yorkshire, stands conspicuous for its bold defiance to the elements. The millstone-grit of Brimham is almost wasted away over a hundred acres, while that of Agra Crags appears to be more capable of withstanding the same agencies; and the well known stones at Boroughbridge have stood the storms of some 2,000 years with little more injury than a few rain channels which scarcely reach the ground. 14.

The building-stones of this strata, as exhibited at the Great Exhibition of 1851, are detailed in *BUILDER Journal*, ix, 639.

MILNE. The name of a family of architects, see MYLNE.

MILNER (THOMAS), designed 1712 "The Gregories" for John Waller, esq., at Beaconsfield, in Bucks; engraved in CAMPBELL, *Vitruvius Brit.*, fol., Lond., 1715, ii, pl. 47.

MILNFIELD or MYLNEFIELD, ESTATE OF, in the county of Perth, supplies the DUNDEE STONE, also called Kingoody stone.

MILO, see the ancient MELOS.

MIMBAR or ALMIMBAR (Span. *pulpito, alminar, faro, torre de mezquita*). A pulpit used in the Turkish mosques. GIRAULT DE PRANGEX, *Arch. Arabe*, 8vo., Paris, 1841, pp. 23, 25, states that it is placed to the left of the mihrab (i.e., right of the spectator), enclosed in the sanctuary, more or less extensive, and enclosed by iron bars; it is a sort of pulpit very richly ornamented, raised to some height, and up to which the *imam* or priest ascends by means of a straight flight of several steps to read prayers and the Koran. A coloured example, at Sunni, is given in TEXIER, *Asie Mineure*, fol., Paris, 1839-49, i. COSTE, *Arch. Arabe*, fol. Paris, 1820-2.

MURRAY, *Handbook for Turkey*, notices a very splendid example in the Suleimanieh at Constantinople; another at Sinope; and a third at Ahmedyeh. An original example of one formerly at Cairo is now at the South Kensington Museum.

MIMOSA. In general, in the northern hemisphere, this tree is confined to tropical countries, or to those which have

a high summer heat; but in the southern hemisphere they extend beyond such limits, as in Tasmania, where *Acacias*, called *wattles*, are the commonest wood.

M. *Odonatissima*, of India; at Calcutta it forms a large tree, and affords excellent timber, and weighs 45 lbs. 6 oz.

M. called *banbooy*, from the forests of Amherst, gives a strong and useful wood, used for posts in building houses. Another variety, called *meet-gnyoo*, is a useful, strong, and heavy wood, red in colour.

M. *Juliflora*, *yoke savaan*, of Trinidad, is a very hard and useful wood.

M. *Jacaranda* or Rosewood, of Brazil, weight 44 lbs. 14 oz., is much used for ornamental furniture.

M. *lebec*, is a white heavy timber; another variety called *chigry* and *tuggula* is said to give a black heavy strong timber. Ton, i, 26, 27.

M. *Xylocarpa*, called *pingadoo* in Pegu, where it is used for knees, crooked timbers, etc., in ship building. A large stately timber tree, remarkably strong and durable. In the Vizagapatam district, this wood is only used for common purposes, as posts and furniture, being faulty in the centre; the average size there is only 12 ins. diam., and 15 ft. long; BALFOUR, *Cyc. of India*, 8vo., Madras, 1857.

MIMUSOPS. A species probably gives the BULLET WOOD, and is the BULLY-TREE from the river Demerara, British Guiana. It shows a diameter of one foot, and gives a fine, close grained, moderately hard and rather heavy wood. It is found throughout the colony, but most abundantly in Berbice, where it is of great size, squares from 20 to 30 ins., and between 20 to 30 ft. long. The weather has but little effect upon it; it is employed for house frames, posts, floors, etc.; the upper portion of the trunk and branches are made into shingles, palings, wheel spokes, etc.

MINAH or MINAR. The name in Hindostan for a tower or pillar. No built monumental pillar probably exists in India, states FERGUSON, *Handbook*, 8vo., Lond., 1855, i, 8, on account of the ease with which it could be pulled down after it had lost the sanctity by which alone it had been protected. Two such pillars, however, exist among the topes at Cabul, evidently coeval with them, and now called the Surkh Minar and Minar Chakri. They are ascribed by tradition to Alexander the Great, though evidently Buddhist monuments, and probably of the third or fourth century of our era; their upper members are meant to be copies of the tall capitals of the Persepolitan pillars; one is illustrated by FERGUSON, from WILSON, *Ariana Antiqua*, 8vo., Lond., 1841. DANIEL, *Oriental Scenery*, obl. 4to., Lond., 1815, gives, pl. 23, a *minar* or tower of victory, at Gour, polygonal for two-thirds of the height of 84 ft., and then circular; composed of brick and grey granite, with a stone staircase inside. In pl. 24 he gives the *Cuttub* or *Kootub Minar*, about nine miles south of Delhi, reported to have been built by Cuttab Shah after 1205. It is 242 ft. 6 ins. high, and 143 ft. circumference at the base; built of a reddish kind of granite, and with a staircase inside leading to three or four balconies.

MINARET (Arabic *menarah*, a lantern). A feature peculiar to Mohammedan religious architecture, consisting of a very tall and slender shaft or turret, rising far above all surrounding buildings of the *mosque* to which it is attached, in several stories, with or without external galleries, but usually having three; the upper one being often corbelled out from the work for a long way downwards, and supporting an open polygonal alcove, which is covered by an onion-shaped dome or pyramidal or conical roof, supposed by its form to be emblematical of the head-dress of the prophet. Most of the roofs are covered with lead, adorned with gilding and other ornamentation. On *fi'te* days they are illuminated.

The minarets, by contrasting with the cupolas and domes, which crown the lower building around it, give a particular character to the architecture attained in no other style. The muezzin or moueddin ascends to one of the galleries, generally the upper; and thence at the prescribed period, five times in the twenty-four hours, and in the stated form, recites a monotonous chant calling the people to their devotions.

The position of the minaret in relation to the other buildings of the mosque, and the number of them, do not seem to be absolutely fixed, though there are generally two, and in the

larger mosques six, one at each of the four corners, and one in the centre of each of the two longer sides; the mosque of Sta. Sophia has seven minarets, added at various times. They are, however, always so placed that the voice of the muezzin shall meet with no obstacle. The erection of minarets seems to date from soon after the Hegira, though in the first year the call to prayers was made at Mecca from the terrace of the *kaaba*: and even in the present day the minarets are raised from the edifice which forms the *enceinte* of the *kaaba*, and not from the *kaaba* itself. The traditions explaining this are set out at length in COSTE, *Architecture Arabe*, fol., Paris, 1820-2. Alwalid I, son of Abdalmalek, is supposed to have been the first to erect a minaret, and this he placed 705 in the grand mosque at Damascus.

The minaret is now a marked feature of Mohammedan buildings to a far greater extent than absolute necessity can require. It forms a very slender and lofty turret, constructed of either brick or stone, upon exceedingly solid foundations, and, independent of the variety of its form and ornament, is by no means less interesting as a study of construction. The winding staircase inside, with a central newel or wall, gives the structure all the strength necessary for its height. Though alike in general principle, minarets differ in form in respect to their country, those in India being covered with profuse and elaborate ornamentation, though not so elegant in form as the plainer erections of Cairo and Constantinople.

GIRAULT DE PRANGEY, *Arch. Arabe*, 8vo., Paris, 1841, pl. 27, pp. 109-10, appears to consider that the tower, built perhaps in the eleventh century, at Torcello; the campanile at Venice; the tower at Seville, and at Morocco, are derived from a common origin, which must be sought at Constantinople. "The use of inclined planes instead of steps, which is peculiar to these towers, seems to be altogether Byzantine, as they are found at Sta. Sophia, and many other Greek churches, where the galleries reserved for women are reached by similar inclined planes. ABOULBAKA narrates, p. 575, that the two minarets of the mosque at Damascus were of Greek construction, and the Arabs made no change in them, unless, perhaps, they added the circular galleries. They are similar to bell towers. In another place, p. 576, he states that there was in the mosque at Damascus yet another minaret built by the caliph Walid. The minarets at Cairo seem to have little resemblance to the towers at Seville and Morocco built in the twelfth century. The one at the mosque of Touloun, founded 879, however, and the most ancient at Cairo, mostly resembles the ancient Arab architecture of Spain, since it shows the horse-shoe arch and the heavy solidity which ceased to be the characteristic of later Arab style." HAY, *Cairo*, fol., Lond., 1840, p. 4, states "that the ascent to this minaret is by an external spiral flight of steps; and it is related that Tooloun, when questioned by his architect (said by S. POOLE to have been a Coptic Christian) as to the plan of it, happened at the time to be twisting a roll of paper into a spiral form, and that thence the idea originated." May not the minaret have been imitated from the LAT and MINAR, or towers of Hindostan and of Cabul, which are far older? If so, it was speedily improved by the Arabs; Sir G. WILKINSON, in Royal Inst. of Brit. Archts.; *Sessional Papers*, 1860-61.

It is observed by PARSONS, *Travels in Asia and Africa*, 4to., Lond., 1808, p. 85, that "it is true there are mosques in Turkey which have square towers, but they were built by the Greeks, and suffered to remain, as in the great mosque at Aleppo and others", e.g., at Taiba, about half way between Aleppo and Bagdad. The tomb mosques outside Cairo are generally square towers or minarets.

Examples of minarets will also be found in the following publications: At Chamekor in Georgia, 180 ft. high; DUBOIS DE MONTPEREUX, *Voyage de Caucase*, etc., fol., Paris, 1839-43; Pl. iii, pl. 28-9 b. and c.; and see index. A curious one occurs in FLANDIN, *Perse*, fol., Paris, 1842-54, pl. 41. SHAW, *Travels*, 4to., Lond., 1757, p. 218. PARDOE, *Bosphorus*, 4to., Lond.,

1839, p. 45. Shaking minarets 1426 at Ahmedabad, GRINDLAY, *Scenery, etc., of India*, pt. i, pl. 3. G. KNIGHT, *Normans in Sicily*, 8vo., Lond., 1838, p. 352. The peculiar form of those in Greece is noticed by DODWELL, *Views in Greece*, fol., Lond., 1821, pass. DALLAWAY, *Constantinople*, 4to., Lond., 1797, p. 57. GIRAUDIT DE PRANGEY, *Arch. Arabe*, fol. plates, 8vo., Paris, 1841, pl. 27. FORBIN, *Voyage dans le Levant*, fol., Paris, 1819, pl. 30, 36, 40, 44-51, 56 and 74. ROSENGARTEN, *Die Architek. Stylarten*, 8vo., Bruns., 1857, pl. 172, gives the M. of Barkuk at Cairo, with the date 1150. The *Description de l'Egypte*, fol., Paris, 1821-29, 2nd edit. GAILLIABAUD, *Mons. anciens, etc.*, fol., Paris, 1842-52.

MINDEN. The capital of the government of the same name, in the Prussian province of Westphalia. It is situated on the left bank of the river Weser, over which is a stone bridge built 1518, 600 ft. long, and 21 or 25 ft. wide; one of the arches, blown up in 1813, is replaced by wood. There are six gates. The streets are narrow and irregular, the houses built of brick or stone, but old-fashioned; one, near the cathedral, is of the Romanesque period. The *domplatz* is planted with trees. The cathedral, dedicated to S. , though not very large, is the largest and handsomest of the three Roman Catholic churches; it dates in the thirteenth century; six windows in the ailes "run riot in their foliations" (MURRAY, *Handbook*); the tower at the west end is of the eleventh century, as is also the chancel arch: the cloisters are good and perfect. There are four Protestant churches, four hospitals, etc. The railway station is given in the ALLGEMEINE BAUZEITUNG *Journal*, fol., Vienna, 1855, pl. 719. Quarries of red sandstone for building adjoin the city.

MINDER (.....), designed at Warsaw the engineer and artillery schools, said to be one of the noblest buildings in that city.

MINDRA. The name used by TOD, *Annals*, 4to., Lond., 1829, ii, 707, for the *cella*, from whence rises the spire or *sikr*, containing the statue of the god in a Hindoo temple, corresponding to the *Vimana*: in front is the *MUNDUF* or the *pronaos*, the *mantapa* or porch; and, again, the portico, or the *gopura* or gate pyramid. Fronting it about twenty yards distant is the *châôri* or nuptial hall, a pillared hall, corresponding to the *choultry*. He is describing the temple to Siva at Barolli.

MINELLO DE' BARDI (ANTON), also a sculptor, of Padua, practised at the beginning of the sixteenth century. 26.

MINERA STONE, Berwig Mountain, Minera, near Wrexham, in Denbighshire. The quarries are situated upon the Minera branch of the Shrewsbury and Chester section of the Great Western Railway, with which line they communicate by means of a siding, thereby having the facility of railway transit for the stone to all parts of the kingdom. They are at the extreme outcrop of the Wrexham coal field, close adjoining the carboniferous limestone. The Minera stone is only found in the Berwig mountain, close upon the mountain limestone, to which position it appears to have been forced by some convulsion of nature.

"Analysis of freestone from Minera quarries, Wrexham, made by Henry K. Bamber, F.C.S.

| | | | |
|-------------------------|-------|------------------------------------|-------|
| Silica | 85.05 | Magnesia | 0.75 |
| Alumina | 8.25 | Alkali | Trace |
| Oxide of Iron | 2.30 | Water and organic matter | 2.22 |
| Lime | 1.00 | | 99.57 |

The stone is very hard and will not be affected by the atmosphere."

The stone is a fine millstone grit, and differs in character very materially from the whole of the sandstones found in the Wrexham and Ruabon Coal Fields, being much harder and more durable. It is of a light colour, and more nearly resembles the Darley Dale stone in colour and appearance than any stone in the market, and is considered superior to that stone in every respect. The beds run from 1 to 5 feet in

thickness, and blocks of any size can be supplied. The stone costs considerably less to work than the best of the Yorkshire stones.

The quarries have been opened for upwards of a century, and the stone has been largely used for building purposes since the opening of the railway above mentioned. The municipal offices at Liverpool are almost entirely built of it, as well as Owen's College, Manchester, built under Mr. Alfred Waterhouse. The stone being also fire-proof, is used by many of the glass, iron, and chemical manufacturers in their furnaces in place of fireclay, which it greatly surpasses in fire-resisting qualities. It is much less absorbent than any other stone, and is not affected by atmospheric changes, with damp, smoke, or chemical gasses. It is very strong, and capable of sustaining a greater crushing strain than most other stones.

R. A. R.

The Berwig quarries and the Pen-y-gelli quarries, from which the stone was principally procured for the building of the National Safe Deposit Company, now erecting (1875), by Mr. John Whichcord, near the Mansion House, are both called Minera stone. The Moss and Cefn quarries afford a softer variety of the same stone. The weight is about 138 to 143 lbs. per cubic foot; the heavier quality is the best as a general rule. It is a fine grained sandstone of medium hardness, varying in colour from a light ferruginous to a greenish brown, in some of the quarries (there are several and this description is a general one) there is a bed of bluish grey; it belongs to the millstone grit series. When the stone is clean worked, and laid on its natural bed, it will stand the effect of weather for a very long period. As it becomes better known it will prove a favourite stone with sculptors and others, as it frets well under the tool. It is also a good fire stone, and being bound together with a silica ferruginous cement, acids do not affect it. Time will tone the colour down to a uniform brown grey.

J. W.

MINERAL BLACK, GREEN, PITCH. See BLACK, ARSENIC, and ASPHALTUM.

MINERAL FUSIBLE CEMENT. See FITZ LOWITZ CEMENT.

MINERALOGY. One of three great divisions into which natural history, or the knowledge of natural objects has been classified; the other two being botany and zoology. There was no very standard work before DANA, *System of Min.*, 8vo., New York, 1844, 2nd edit.; 5th edit., 1868. LYELL, *Manual of Elem. Geology, etc.*, 5th edit., 8vo., Lond., 1855, and Supp. 1857. ANSTED, *Elem. Course*, 2nd edit., 8vo., London, 1856; and *Relations of Geology with Architecture*, read at Royal Inst. of Brit. Archts., *Sessional Papers*, 1867. BRISTOW, *Glossary of Mineralogy*, 1862. PHILLIPS, *Outlines of Miner. and Geol.*, 1863. JACKSON, *Minerals and their uses*, 8vo., London, 1819. The *Mineral Products* in Class 1 of the Great Exhibition of 1851, *BUILDER Journal*, 1851, ix, 587, *et seq.* HUMBLE, *Dict.*, 3rd edit. revised, 1860.

14.

The Mineralogical museum at Paris, in the hôtel des monnaies, 1768-75, by J. D. Antoine, is decorated with twenty large Corinthian columns, forming perhaps the finest saloon of its kind in Europe. The galleries of mineralogy and geology in the natural history museum at Paris, are by Rohault de Fleury, and are given in the ALLGEMEINE BAUZEITUNG *Journal*, 1838, pl. 219-20; p. 261-71; and in his own work, *Museum d'histoire, etc.*, fol., Paris, 1844.

MINERVA. The goddess of wisdom, of arts and of sciences, so called among the Romans, and known to the Greeks as Pallas Athene; she is supposed to be the Neith of the Egyptians. The name has been asserted to be a shortened form of *Meminerua*, since she was the goddess of memory. Her statue was usually placed in schools: she presided over olive grounds. From some inscriptions in which the name Minerva Medica occurs, it is supposed she also presided over the healing art. The attributes of Minerva correspond in most respects to those of Athene. She has a helmet on her head

and a plume nodding in the air; sometimes the helmet is covered by the figure of a cock; a spear in her right hand, sometimes a distaff in lieu of it, with the left grasping a shield on which is the head of the dying Medusa; the same figure is also on her breastplate; and sometimes she herself has serpents about her bosom and shoulders. Most of the statues of Minerva represent her as sitting. The helmet is also shown with a sphinx in the middle supported on either side by griffins; and on some medals, a chariot drawn by four horses, or, in other instances, a dragon or serpent with winding spires appears at the top of the helmet. 6. 14. 59.

VITRUVIUS, i, 2, states that temples to Minerva were erected of the Doric order; vii, that they should be placed on some eminence which commands a view of the greater part of the city: and vii, Introd., records that Phileos wrote a volume on the Ionic temple at Priene; and Ictinus and Carpion on the Doric temple on the Acropolis at Athens.

Many magnificent temples were erected to this goddess in Egypt, Phœnicia, Greece, Italy, Gaul, and Sicily: see Assisi; Athens; Sunium; Syracuse. Minerva polias occurs at Athens and Priene; M. medica at Rome; M. cranea at Eleuta; many others are illustrated in BLOUET, *Morée*, fol., Paris, 1831-5. The forum of Nerva at Rome was called the Temple of Pallas.

MINESCHEREN (JOHANN VAN) of Ghent, "cir. 1550, is likewise held to be a good architect," VASARI, *Lives*, edit. 1852, v, 464.

MINGBA. The native name for a timber of Amherst, E. Indies, used for posts for houses, rafters and such like. 71.

MINGOLSHEIM (HANS VON), see HANS (MEISTER).

MINGUEZ (DON JOSEF), born 1683 at Escalante in Aragon, studied under his uncle, Juan Bautista Perez, after whose designs he constructed, with his first cousin Juan Perez, the church of the college of S. Pio V, at Chelva. With the same assistance he likewise built the towers of the churches of S. Lorenzo at Rusafa, and at Chelva. He died 1757 at Valencia, in Spain. 66.

MINHART VON SOLDERADE, was in 1398 *baumeister* of the tower of the Stephanskirche at Tangermunde. 92.

MINIMS or MINIMI. An order of religious who improved on the humility of the Friars Minors, by calling themselves the Least or smallest. They were instituted about 1440 by S. Francisco de Paula (born 1416), confirmed 1473 and 1507. Their superior was called a corrector. In France they had the name of *Bons-hommes*. No house of this order was ever established in England. L. DONY D'ATTICHY, *Hist. Gen. de l'Ordre sacré des Minimes*, 4to., Paris, 1824. One of the establishments, erected near the *Place royale* at Paris, was the last work of F. Mansard. 14.

MINION. An ore of iron used in mortar; with lime and sand it forms a water cement. 2.

MINIUM or RED LEAD, sometimes called Ephesian red. It is a red oxide of lead, and is made by the medium of a reverberatory furnace. The pigs of lead are melted in these furnaces, and while in a fluid state the metal is raked and stirred by means of an apparatus suspended from a chain and held by a workman. The stirring continues several hours, by which time the metal, through imbibing oxygen, has lost its fluidity, its whitish colour, and its metallic lustre, and has become a greyish yellow powder. A further process separates a small portion of unchanged lead from the powder, which then becomes a yellow pigment called *massicot*; and this *massicot*, by a second exposure to the furnace, becomes converted into the still more useful pigment—red lead. ENGLISH CYCL., s.v., *Lead*. It differs from LITHARGE with which it is sometimes confounded. This colour is found in greater or less degrees of depth in most of the decorations and paintings which exist at Herculaneum. Minium paint, see IRON PAINT.

Grey Minium for coating metals was patented in 1857-8; it is said to have a dark olive coloured lustrous surface, glazing

the metal with a tenacious and compact coating which quickly dries; BUILDER *Journal*, xvi, 166.

CINNABAR or SINOPER, or vermillion, was the ancient minium; LIBRARY OF ENTERT. KNOWLEDGE, *Pompeii*, ii, 52-6.

MINJARES (JUAN DE). In 1568 he appears as appointed to the post of sole director of the works for the foundations of the Escorial. On February 25th, 1574, on the recommendation of Juan de Herrera the architect, he received the appointment of sole director of the works at Aranjuez. In the same year he was placed in a similar position, for the construction of the church of the Escorial, erecting for Philip II, in succession to Pedro de Tolosa and Lucas de Escalante. In 1575 he succeeded Juan de Herrera in the erection of the chapel royal at Aranjuez, at the same time that Diego de Alcantara succeeded the same artist in the work at Toledo. On April 19th, 1576 he succeeded Lucas de Escalante and Pedro de Tolosa, as *aparejador* or sole director of the stone work of the church of S. Lorenzo, at the Escorial, under Herrera; and up to the year 1584 was engaged upon the façade and principal porch of that edifice. In 1577, while director of the works of the Escorial, he received a visit from Miguel Arizar, *major domo* for the erection of the church of Espinar, accompanied by Pedro Gordo, the alcade of that town, who desired to consult him regarding the method of its construction. Being unable personally to leave the work which he had then in hand, Minjares instructed Anton Ruiz and Bartolomé de Eloriaga, at that time engaged upon the work of the monastery, to visit the place and examine the character of the proposed work. These deputies returned in five days; and upon receiving their report, Minjares made the drawings together with the specifications. About 1583 he succeeded Juan de Orea, by royal mandate, as chief constructor of the church of the Alhambra in Granada; of the palace at Seville; and the royal stables at Cordova. In 1584, after completing the stone work of the Escorial, he paid a visit to Seville for the purpose of consulting with Ascensio de Maeda, the *maestro-mayor*, regarding the completion of the chapter house of the cathedral, one of the finest works in the kingdom. In the following year (1585), Minjares undertook the erection of the *lonja* or exchange at Seville, under Juan de Herrera; it was completed 1598, on a site 200 ft. square. In 1586, he was appointed by king Philip II, in conjunction with four colleagues, Geronimo Gili, Andres de Vergara, Lucas de Escalante, and Bartolomé Ruiz, to execute the eastern and western portions, and a part of the porch of the chapel at Aranjuez. Lastly, in 1590, while engaged on the exchange, he was associated with Martin Infante, director of the works of the palace at Seville, with regard to the method of roofing the church of the hospital of La Sangre in that city. The opinion upon this latter point is given by LLAGUNO, and is signed by Minjares and his four coadjutors, Martin Infante, Luis de Villafraña, Francisco de Peña, and Gonzalo Fernandez. The document, which is purely technical, refers to the difficulty attending the work, owing to the span of 35½ ft. from pillar to pillar. The details of length and breadth are fully given, and the mode of constructing a proposed timber roof which should be secure. The scheme was, however, never carried out, a stone vault being substituted in place of the proposed wooden roof. The date of his death is unknown. Another notice of Minjares occurs in connection with the will of Juan de Herrera, dated 5th December 1584, in which he directs that a sum should be paid to Minjares sufficient to cover the expense of keeping a horse he had sent to him from Andalusia, while acting for Herrera, as superintendent of the works of S. Lorenzo. 66.

MINNAGLAN QUARRY, situated near Glenties, co. Donegal in Ireland, supplies a sandstone of various qualities and strength, weighing about 144 lbs. to 152 lbs. per cubic foot when dry. It is a loosely aggregated gritty gneissous rock, used for dressed work; in the neighbourhood it is called

millstone. WILKINSON, *Practical Geology*, 8vo., Lond., 1845, p. 329, and No. 102 of Experiments.

MINOS AND MINOTAUR, see LABYRINTH.

MINSK. The chief town of the government of the same name in European Russia, is situated on the river Swistocz or Svislotsch, a tributary of the Beresina. Like all old Polish towns it is irregularly built with timber houses in narrow crooked streets. It has a fine cathedral dedicated to S. an abbey of the Greek church; several Greek and Roman churches, a gymnasium, a handsome theatre, two castles, and a synagogue.

14. 50.

MINSTER (Gr. *Μοναστήριον*). A term for large monastic churches, first used by EUSEBIUS, *Hist. Eccles.*, b. ii, c. 17. In the larger sense the mediæval Latin word *monasterium* means a monastery, including the church, the buildings, and the whole society; in the restricted sense it means a minster (Ger. *minster*; old Fr. *moustier*), that is, any great church whether strictly monastic or not. Since the suppression of monasteries in England, the term minster is applied only to churches formerly connected with a few of the most eminent of them; thus, BINGHAM, *Origines*, 8vo., London, 1840, ii, 358, states that "at this day the Germans call some of their churches *minsters*, as we do minsters, which were heretofore collegiate churches and schools of learning, like S. Austin's monastery church." WHITAKER, *Cath. of Cornwall*, 4to., London, 1804, ii, 159, notices, from a Saxon Chronicle, p. 21, that Nynian's priory house was called "his mynster." Parish churches in 960 were called minsters, and several churches in Dorsetshire retain the name. These were the original outposts of the church, isolated stations of priests living under rule and in community, which in time became parishes. WALCOTT, *Sacred Archæy.*, 8vo., London, 1868, p. 377.

In England, the name is still annexed to Sherborne and Wimborne, Southwell, Ripon, Beverley, and West-minster; as also to York and Lincoln by custom; and hence perhaps Il-minster and other places. York though called a minster was never occupied by monks, but from a very early time by a body of secular canons, who retained the name of "Culdees" until the reign of Henry I. Ecclesfield church in Yorkshire, has been known for ages as "The Mynster of the Moores". FREEMAN, *Minsters and Parish Churches in England and France*, in *BUILDER Journal*, 1862, xx, 255.

MINSTREL GALLERY, see LOFT.

MINSTREL PILLAR. On the sixth pillar, erected 1513, of the north side of the nave of S. Mary's Church, Beverley, occur the images of five minstrels with the inscription "Thys pyllor made the maynstrels"; they each carry their instruments; as illustrated in ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., Lincoln, 1868, p. 103.

MINT. The place where money is coined. RUDING, *Annals of the Coinage of Great Britain*, 3rd edit., 4to., Lond., 1840, gives a plan of the London mint. Report from Select Committee of the House of Commons, on the Royal Mint, ordered to be printed 30th June 1837. ANTOINE, *Hôtel des Monnaies*, fol., Paris, 1826. The *Zeccha* at Venice was designed by Scamozzi.

25.

MINUTE. In geometry, the 60th part of a degree. In architecture, according to various writers, it is the 12th, the 18th, or the 30th part of a MODULE, which last is usually equal to the half diameter of a column at the base.

MINUTOLI (GIACOMO) with Andrea Arenese and Antonio Tardi, rebuilt, 1807-29, the palazzo pubblico at Messina. He also designed the façade of the monastery of S. Francisco d' Assisi in the same city.

28.

MINYAS, TREASURY OF, see ORCHOMENOS.

MINZARES (JUAN DE), converted 1584 into stabling the lower story of the *alcázar nuevo* at Cordoba, built 1312-50 for the inquisition, which was afterwards the prison.

66.

MIQUE (CLAUDE), son of Renauld Mique and Marie Basset (apparently the daughter of a master carpenter), was

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born 19th September 1714, in the parish of S. Sébastien, at Nancy in Lorraine. He had the title of *architecte du roi*, and constructed great part of the buildings executed for Stanislas, ex-king of Poland (from 1704), and published a large plan of the town of Nancy, and another on a smaller scale; three other plans of the town by him are in existence. His son, JOSEPH, was baptised 22nd February 1757, in the church of S. Roch, at Nancy in Lorraine; his chief work seems to have been the hôtel-de-ville at Pont-à-Mousson. Another son, LOUIS JOSEPH, must have been born before 1743, as he was engaged with his father in the construction of the barracks commenced 1764, on the designs of Richard Mique, at Nancy in Lorraine.

MIQUE (RICHARD), born 18th September 1728, in the parish of S. Sébastien, at Nancy in Lorraine, was the son of Simon, who was probably a brother of Renauld Mique, contractor. He studied 1740 under the engineer Barbier at Strasbourg, and afterwards under the sculptor Muet at Nancy. Having completed, under the superintendence of his father, the rebuilding of the left wing that had been destroyed by fire, at the château de Lunéville, he went to Paris, and studied in the school of Blondel. On his return, he obtained 28th July 1759, the titles of conseiller, secrétaire du roi, and contrôleur en la chancellerie du parlement de Metz; he designed the barrack, and the porte Ste. Catherine, begun 7th July 1762, but taken down in August 1768 and rebuilt on another site; and the porte S. Stanislas, begun 31st July 1762; these had been confided to his skill three days after the date of his letters of nobility, given 16th November 1761, at Lunéville, which were confirmed 29th April 1764, in France. The success of this design raised him to the rank, 1762, of ingénieur en chef des ponts et chaussées de Lorraine et du Barrois; and in the following year he succeeded Héré as royal architect. He was named architect to the new barracks for 4000 men, by a decree dated 25th October 1763; its first stone was laid 14th July 1764, and its construction was entrusted to Claude and Louis-Joseph Mique. Near it, and at the end of the rue Girardet, was the family mansion, now the école impériale forestière; and the portal, mentioned as a *chef-d'œuvre*, is perhaps his work. The rank of chevalier of the Order of S. Michael was conferred upon him 8th May, 1763. The design for a palace of the intendant with other barracks, which is given with his portrait after Heinsius 1782, and armorial bearings, in MOREY, *Richard Mique*, 8vo., Nancy, 1868, was planned at the desire of the duc de Choiseul, born at Nancy, and negotiator of the marriage of Marie Antoinette. To this personage he probably owed his appointment as architect to that queen. Removing to Paris, he obtained, 10th January 1766, the appointment of intendant et contrôleur-général des bâtiments et jardins de la reine; and erected the church of the Carmelite nunnery, which contained the tomb of the princess Louise, at S. Denis. On the gift of the petit Trianon, built by J. Gabriel, to the queen, 31st May 1774, he was employed on the additions to that edifice, and on the internal decorations of its suite of state apartments, representations of which are given in PENOR, *Arch. Decor. de l'époque Louis XVI*, fol., Paris, 1864; the boudoir was reproduced by Genoux and Co., in the Exhibition of Industry at London 1862, and engraved in the *ILLUSTRATION Journal* of 27th September in that year. On 25th July 1774, the queen, who had given to her new property the name of "le petit Vienne", ordered that a jardin à l'Anglaise, like that belonging to the duc de Chartres, and another belonging to M. Boutin, should be formed in its grounds; and thereon Mique, in conjunction with the painter Hubert-Robert, obliterated the work of Le Nôtre, by his lake, streams, theatre, temple to Love, kiosque or breakfast saloon also used as a concert room, mill, parsonage, keeper's lodge, dairy, bailiff's house, and a cottage for the queen, which though simple outside, cost 60,000 francs in furniture; these may be the maison du Curé, pl. 10; laiterie et tour de Marlborough (open elevated balcony), pl. 88; maison

du garde, pl. 141; maison du meunier, pl. 146: cuisine, desservant la maison du Bailly, pl. 150; and Chaumière, pl. 157, all in an English cottage style, given in NORMAND, *Paris Moderne*, fol. Paris, 1849, iii. When the king of Sweden, who had been lodged there, left France, he testified his admiration by requesting permission to have plans and views of this place. The same queen acquired the domain of S. Cloud from Philippe d'Orleans, 20th February 1785, and immediately commissioned Mique to bring it into conformity with her tastes for small rooms and landscape gardeuing. Mique left little of the mansion except the principal front by Girard, the pavilions by Le Pautre, and the galerie d'Apollon, the salon de Mars, the cabinet de Diane, which contained the paintings by Mignard. He changed the internal arrangements, built a chapel doubling the right wing, converted the former chapel into the grand staircase, built the queen's staircase doubling the left wing, and effaced the most by doubling the central portion of the edifice; he treated the grounds in a similar manner, entirely designing the smaller park, and erecting the (now destroyed) pavillon de la Félicité; but his labours were arrested by the events of 1789. BALTARD, *Paris et ses Mons.*, fol., Paris, 1893. Some works at Fontainebleau are indecisively attributed to him; and his biographer claims for him a share in the design of the porte des Iles, on the road to Metz, erected 1785 at Nancy, by the architect Melin; as also the design of the parish church at S. Cloud commenced by order of Marie Antoinette, but not completed until 1820. M. J. Hurtault was one of his pupils. C. A. Guillaumot was promised the reversion of the post of premier architect, held by R. Mique, who, elected 1775 into the Academy of Architecture at Paris, was the last director of it.

His son SIMON MIQUE d'Heillecourt, a property near Nancy, which Richard had probably acquired before 1763, was a conseiller à la chambre des comptes, and was guillotined a few minutes before his father (who had been appointed intendant de la liste civile, by Louis XVI) suffered the same fate, 8th July, 1794.

MIRABAN. A light-red coloured wood of Penang, much used for ship building, furniture, etc. 71.

MIRADOR. A Spanish word used to express a belvedere, gazebo, or overhanging bow-window.

MIRANDA-DE-DOURO (Sepontia of the Romans). A small city in the province of Tras-os-Montes, in Portugal, situated on the river Douro. It was formed into a see 1545 by king João III, which see was transferred 1782 to Bragança, the bishop retaining both titles. The first stone of the present cathedral, dedicated to the Virgin, was laid 24th May 1552. It is a plain cross church with aisles to choir and nave, and sacristies on the north side. The three arches of the nave are semicircular; the windows narrow, with square headed single lights; the vaulting plain Flamboyant. The west front with its two towers is Italian and probably rebuilt or recased. The edifice "exhibits in a curious way the last struggle of Flamboyant against Classicism". The *paço episcopal* at the east end is in ruins. There are still some fortifications. ECCLESIOLOGIST *Journal*, 1853, p. 382. 28. 50.

MIRANDA. A word used in SOTHERAN, *York Guide*, 8vo., York, 1796, p. 65, for the terrace 200ft. long with a balustrade in front, on the first floor of the grand stand at the Knavesmire race-course, whence the company can see the races.

MIRROR. A small looking-glass. In architecture it is a small oval ornament cut into the deep moldings and separated by wreaths of flowers. 6.

MISCHIA. The name by which SCAGLIOLA is called in Italy. 1.

MISCOLELE. Two brothers of this name were natives of Fleims, in the Austrian Tyrol: both died about the end of the eighteenth century. They built the fine tower to the market at Borgo di Valsugana (Worchen). 26.

MISER. An instrument like an auger, first used in England 1794, for sinking an Artesian well by B. Vulliamy at Norland House; the irruption or blow of sand was only overcome by this instrument. In a well sunk at Messrs. Watney's distillery, the cylinders were 11ft. diam. the miser 5ft., and turned by twelve men at a time. NICHOLSON, *Journal of Philosophy*, ii., 266. INST. OF CIVIL ENGINEERS, *Minutes*, 8vo., Lond. 1843, p. 59.

MISERERE, sometimes called (Fr.) *misericorde*. Properly a small shelf, *subsellia*, or rest, fixed under the seat of a stall in the choir of a church. The seat, being hinged, turns up when not required for sitting down upon; and to afford some relief to a canon who might feel fatigued with long standing, the shelf allows him to rest back upon it when the seat is half turned up. It was called *miserere*, probably from being a merciful contrivance to relieve the fatigue attending long services. The fact, that if the canon fell asleep during prayers while so resting, he would naturally fall forward and the seat shut down with a noise sufficient to attract attention, might also account for an exclamation of "*miserere mei*" in regard of an expected penance, or the blow on the head he might receive in falling forward: MILNER, *Winchester*, ii., 87. Under the rest was usually a molded corbel-like finish, but more often some carving or coat of arms, the former occasionally representing strictures upon the monks, with ludicrous and even indecent figures; the reason for which has not yet been accounted for. BUILDER *Journal*, 1861, xix, 336. HEWETT, *Twenty Examples from the cathedral at Exeter*, 4to., 1849, which are among the earliest examples, before 1244, but some are perhaps later than 1254, in which year king Henry III, on his return from his pilgrimage to the shrine of S. Edmund of Pontigny, brought an elephant with him to London, a representation of which animal forms one of the subjects: probably the one given in BUILDING *News Journal*, 1871, xxi, p. 68, from the cast in the Architectural Museum. Another representation of it is seen in one of the misereres in Gloucester cathedral. Another of the oldest remaining specimens, in the style of the thirteenth century, is in Henry VII's chapel at Westminster. JEWITT, *Art under the Seats*, in *Art Journal*, 1875. WRIGHT, *Essays*, 12mo., Lond., 1861, ii, 112.

MISERICORDIUM. A hall for eating flesh meat in a monastery, as at Tewkesbury, Westminster, Worcester, and Peterborough. Some convents, as Canterbury and Westminster, had country hospitals for convalescents; in the latter case it was at Chelsea. WALCOTT, *Sacred Archaeology*, 8vo., Lond., 1868.

MISERON (D....), of Prague, see LURAGO (C.).

MISLETOE, the viscum album. For the supposed unique use of it in sculpture at Bristol, see LEAFAGE, p. 52.

MISNA. The ancient name of DRESDEN, in Saxony.

MISSION CHURCH and MISSION HOUSE. Workmen and others engaged upon a large undertaking far away from any town or village, form of necessity a shifting population, as when their immediate work is accomplished, their dispersion will be as sudden as was their calling together. It is neither needful nor desirable in this case to erect a permanent and substantial house of prayer, only a temporary building being required. Hence a "Mission church" constructed of iron or wood in such a manner that it can be easily removed when the population for which it was erected has dispersed is by far the most suitable provision that can be made. Again, the fixed residents of widely scattered country parishes, and of over populated town districts, are beyond the reach of the Church's influence as exercised through the existing parochial organization. The Mission church here should be therefore of a more permanent and substantial character. These buildings were started about 1855, by Archdeacon H. Mackenzie, "the father of the Mission-house scheme", in his *Plea for Mission Houses*. Where it is found necessary to use a portion of the building for a school, care is recommended to be taken to make a marked difference in the architectural and other arrangements,

between the portion so employed and the part used solely for religious services. A small chancel might be provided, appropriately fitted up, and entirely closed off from the school by folding doors. Several have been erected for about £700 and upwards. *CHURCH BUILDER Journal*, 1868, p. 167; which gives 1871 p. 49, a view of S. Andrew's waterside mission chapel at Gravesend by G. E. Street, erected at a cost of about £1,000: also 1873, p. 51 and 89, contains articles. The house, chapel, and schools 1861, by A. W. Blomfield, in Bedfordbury, London, is illustrated in the *BUILDER Journal*, xix, 806. A good specimen of such chapels may be seen in Duke-street, St. Giles's; the basement of the house forms a complete little church, while the upper rooms are arranged for men's clubs and women's sewing classes.

MISSOLOGHI. A town of Livadia, in Greece. It is a place of considerable strength. A pelagic monument about four miles distant is given in GAILHABAUD, *Monumens*, fol., Paris, 1850, i, from DODWELL, *Cyclopean remains*, fol., Lond., 1830. It consists of a great hall, divided in its length by five parallel walls, the chief of which is about 6ft. 6in. thick and 24ft. 6in. high, built of rather smaller stones than those used in the walls of the old city which they adjoin. Each wall is pierced by three openings narrowing upwards, like those at Mycenæ, Tyrins, and elsewhere.

MISTAL. A COWSHED or Cattle shed.

MISTRA, or **MISITRA**. A town of the Morea, in Greece, supposed to be the site of the ancient Sparta. On a detached rock, rising 500ft. above the adjoining plain, is the castle or citadel, a Venetian fort of an octangular form with a regular crenelated wall. The plan of the *Panagia* or Greek church, 1210-50 (?), is given in *Illustrations, CHURCH PLAN*, from COUCHAUD, *Eglises Byzantines*, fol., Paris, 1842; it is 56ft. by 43ft., and possesses a porch, an open lateral arcade, and a belfry, resembling the churches of Sicily more than those farther north. There are also a mosque, and antique fragments in the houses. BLOUET, *Morée*, fol., Paris, 1833, ii, pl. 41-3, give a general view; and the fountain, with four bas-reliefs of marble sarcophagus.

MITCHEL. A name given by workmen to a Purbeck stone when picked of a size from 15ins. to 24ins. square, as wrought or squared for paving. SALMON, *Palladio Londinensis*, 4to. Lond., 1755, Gloss. In the *Extracts from the Records of the City of London*, Royal Exchange 1564-1823, fol. Lond., n.d., 122, is an agreement with Thomas Cartwright, mason, 7 April 1669, "for paving the upper pawne with Mitchells per foote sd."

1. 2.

MITCHELL, (R....) designed Silwood Park near Staines, Berkshire, about 1787, for Sir James Sibbald, bart. (NEALE, *Seats, &c.*, 4to., Lond., 1818); Heath Lane Lodge, Twickenham, for Isaac Swainson, esq.; Cottisbrooke, Northamptonshire, for Sir W. Langham, bart.; Moore Place, near Hertford, for James Gordon, esq.; Preston Hall, Mid-Lothian, for Sir John Calander, bart.; and the Rotunda, Leicester-square, for Mr. Barker, 90ft. diameter outside, 85ft. inside, and 57ft. high inside: the upper picture was 50ft. diameter; these are given in his work, entitled *Plans, &c., of buildings erected in England and Scotland; with Essay to elucidate the Grecian, Roman, and Gothic Arch.*, 18 pl. fol. Lond., 1801. The dates of his birth and death are unknown.

MITECAR, (MARTIN DE). In 1563, don Hernando de Aragon, grandson of king Fernando, and archbishop of Zaragoza, amongst other works conceived the idea of founding the Carthusian monastery of Aula Dei. But previously to commencing the actual work he sought to obtain drawings of other monasteries of the same order, as stated by Diego de Espés in his manuscript on the ecclesiastical history of Zaragoza. Maestre de Mitecar, then superintendent of the works, was deputed, in company with a monk, don Miguel Bernabé, to inspect the monasteries of Valencia, and make plans of the same. At the same time maestre Miguel de Riglos, deputy master

of the works, was sent with father Miguel de Vera to make those of Catalonia. LLAGUNO remarks upon the extreme care and judgment displayed at that period in architectural matters, and the anxiety of the archbishop of Zaragoza to secure the services of the most eminent members of the profession. From these facts he argues that the two persons above named must have ranked high, though he had been unable to meet with detailed notices of any other employment. 66.

MITER, see **MITRE** and **BEVEL**.

MITHRAEUM. Of all the temples or shrines dedicated to Mithra in Rome, the only one known to remain is that discovered in 1870 by father Mullooly, in the course of his excavations under the basilica of San Clemente. This hall or chamber, about 30 ft. long and 20 ft. wide, the floor 30 ft. below the present surface level, is situate just beyond the apse of the ancient basilica and much below its level. It appears to have formed a portion of a fine Roman dwelling, called the house of Clement, above which the ancient basilica, was erected. The vault is pierced by eleven *luminaria* or skylights, and the whole is decorated with mosaics, the ceiling imitating a grotto. The altar and other arrangements remain *in situ*. It is evident that this was not originally a Mithraic cave, but a large room changed and adapted to the Mithraic mysteries. MULLOOLY, *Saint Clement, pope and martyr, and his basilica in Rome*, 8vo., Rome, 1873, p. 213-38. *ARCHAEOLOGICAL JOURNAL*, 1871, p. 161. LAJARD, *Recherches sur le culte publique—de Mithra*, fol., 1847-8. MAURY, *Croyances et légendes de l'Antiquité*, 8vo., Paris, 1863. A Mithraic group, of the god kneeling on a bull which he is slaying, which is at the same time attacked by a dog, serpent, and scorpion, is in the British Museum among the Roman works of art. An engraving of this group, with another of a winged Victory, and an account of both, is given in *SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE*, British Museum, *Townley Gallery*, 8vo., Lond., 1836, i, 283-90. Others occur in CLARAC, *Musée de Sculpture Antique*, 4to., Paris 1826, ii, pl. 203-4; MILLIN, *Galerie Mythologique*, 8vo., Paris, 1811, ii, pl. xviii, no. 82.

A. C.

MITLA, contracted from MIGNITLAN, signifying in Aztec, a place of woe. A village of the Mexican confederation, and formerly the burying place of the Tzapotican monarchs, is situated near Oaxaca. The monument or tomb, palace, or temple, is so entirely original as to defy the stoutest advocate to find an associate for it. It consists of a portico 160ft. long, the roof supported by a row of six porous stone (porphyry?) pillars without caps or bases 19ft. high, down the centre, and having behind it a building about 65ft. square, on the middle of which is a court with four apartments opening into it. The walls slope *outwards*, which is exceptional, in three deep rustic courses, having panels on the face filled with frets and forms only seen in Mexico. There are subterranean apartments also; but nothing has yet been found to prove the date of its erection; FERGUSON, *History*, p. 765-6. In front and on each side of the above building are similar porticoes with five pillars to each. There is also a *teocalli*. *SMITHSONIAN Contributions to Knowledge*, vol. ix. CHARNAY ET VIOLLET-LE-DUC, *Photog.*, etc., 8vo., p. 77, and fol., Paris, 1862-3.

MITRAHENEH, or **METRAHENEH**, see **MEMPHIS**.

MITRE ARCH. A term used by BATISSIER, *Hist. de l'Art*, 1845, p. 473, for a pedimental arch formed by two rectilinear faces meeting at the top in an acute angle. Examples are found in Celtic, Cyclopean, and Greek art, as at the door of the theatre and walls of Messene. In the palace of Constantine, and in the walls at Constantinople; in old edifices at Ancona, Como, and Rome; in England, as at the church at Clapham in Bedfordshire, and the church of St. John at Boston, in Lincolnshire; as well as in Auvergne and the Bourbonnais, in France; proving that the suggestion by RICKMAN and others, that this sort of arch is a mark of merely pre-Norman or Saxon work, is not justified.

MITRE or **MITRE JOINT**, (Lat. *unguis*, It. *spigolo*, Fr.

onglet), sometimes called angle joint. The angles of woodwork required to be secured together, either by tongues or rebates, as well as nails or screws. The usual publications on joinery show illustrations of the mode of forming the mitre; also BREESE, *Glossary*, 1853, p. 11. The mitre joint is eminently not a feature of mediæval joinery.

MITRE BEVEL. An instrument for taking angles in joinery; see BEVEL.

MITRE BOARD. The name given to a piece of wood having one end cut to an angle of 45 deg., or a mitre angle. One is shown on the tombstone and in the hands of Alexandre de Berneval, died 1440, the master mason at the church of S. Ouen, at Rouen; figured in GILBERT, *Descr. Hist.*, 8vo., Rouen, 1822, p. 54; his pupil has a square piece. The tomb is in the chapel of S. Cécile on the north side of the choir. An incised slab in the same chapel, to the architect by whom the earlier portion of the church was commenced about 1318, gives his portrait holding a board on which a window is traced, the upper edge being cut to a right angle, and having three other angles marked on it. Prof. Willis states it is the only one he had seen. *ARCHÆOLOGICAL Journal*, 1850, p. 391, 403.

MITRE BOX is another instrument for similar use to the bevel; it is composed of two pieces of wood of an inch thick each, one being fastened upright on the other. The upright piece has on its upper edge certain mitre lines struck which are sawn down; bevils or mitres to join frames of five, six, or any more sides are readily made. Then in sawing the end of any batten to the required angle, it is placed against the upright piece, the saw inserted in the kerf already made, and worked down, whereby the angle required to the batten is obtained.

MITRE CLAMP. A piece of wood receiving in a groove at one edge the rebated ends of other pieces, as shown in a cut *s. v.* CLAMP.

MITRE DOVETAIL, see LAP DOVETAIL.

MITRE-HEADED TURRET. A name sometimes given to the turrets of king Henry VII's chapel at Westminster, which have a peculiar bulbous termination. They are called ogee-headed.

MITRE SQUARE has two arms at right angles, each about one inch thick and three inches wide, one called the handle, the other the tongue. The projecting corbel in Gloucester cathedral, figured in CARTER, *Arch. Antig.*, fol., Lond., 1795-1807, and also in MURRAY, *Handbook to English Cathedrals*, is in the form of a builder's square, and has been called the 'apprentice's square', but was probably intended to sustain a light.

MITRE ABBEY. An abbey, the abbot of which had the privilege of wearing a mitre. Certain of them holding their temporalities *per baroniam* were summoned by writ to sit in the national councils; and altogether with many others had permission from the pope to wear the mitre. In 49 Henry III sixty-four abbots and thirty-six priors were summoned to Parliament; but Edward III reduced the number to twenty-six, to which Henry VIII added another, according to GODWIN, *English Archaeologists' Handbook*, 8vo., Lond., 1867, p. 132; but BRITTON, *Diet.*, says they were reduced to twenty-five abbots and two priors, to whom two other abbots were added. The prior of S. John of Jerusalem, the abbot of S. Alban's, and the abbot of Glastonbury, took precedence, the remainder promiscuously. There were four lady abbesses, namely, Shaftesbury, Barking, S. Mary at Winchester, and Wilton.

MITRING. The term used to express that a set of moldings or surfaces are returned at an angle with precisely the same contour. Where they pass or are not of the same contour, they are called INTERPENETRATING MOLDINGS, as seen in late Gothic edifices in England, and particularly on the continent.

MITYLENE, see MYTILENE.

MITZEL (.....), a Polish architect, laid out Sophiowoki, in Podolia, in the manner of Switzer. It is a magnificent residence of the countess Potocki, having a grand terrace or

promenade, and extensive avenues, conservatories, and gardens, *LOUDON, Encyc. of Cottage, etc., Arch.*, 8vo., Lond., 1842, § 463. 58.

MIXED ARCHES. A term given to the elliptic, elliptic pointed, three centred pointed, the four centred pointed, and similarly formed arches.

MNEMOSYNE, see MEMORY, TEMPLE TO.

MNESICLES, was born a slave in the house of Pericles, by whose directions he built the *propylæa* of the acropolis or Athenian citadel, the erection of which occupied five years, B.C. 437-433. While so engaged, he fell from an eminence, and was healed by his master with a herb, said to have been pointed out to him by the goddess Minerva. A brazen statue of Mnesicles was cast by Stipax, and this statue was designated Splanchnoptes; PLINY, l. c.; xxxiv, 8, 19. SILLIG, *Artists*, etc., 8vo., Lond., 1836. MILIZIA, *Lives*, quoting PLINY, xxii, 17, states it was one of the artificers, named Splanchnoptes, that was injured. BURNOUF, *Arch. de Missions scientifiques*, Paris, 1848, i.

MNESTHES, see MENESTHES.

MOAT or **MOTE** (low Lat. *mota*; Fr. *douve*, the fosse, *motte*; Sp. *motte*). Strictly a heap or hillock; the dune on which a tower was built forming the original castle; around it grew the fortifications. **DUNGEON.** **MOAT** or **tumulus** are the terms still given in Ireland to the stone and earthen mounds containing kistvaens, sepulchral chambers, and galleries.

In the parish of Lochmabin, co. Dumfries, is an artificial mound called Rockhall moat, of which there are many in that part of the county, and of the most remote antiquity. It is perfectly round, terminating in a sharp top, and is larger than many of them and very entire. It is generally agreed that the people met on them to make laws and administer justice; as in the Isle of Man at present; some of the court houses in England are called the mote, or mote, or MOOT HALL.

The public courts of the Saxons were called witten-mote or witten-a-gemote, perhaps the original of the parliaments of England. In the parish of Glencairn is a moat occupying an acre of ground, with an earthen turret at each end. On the east side of Lag castle, in Nithsdale, is an artificial mound, called a moat or court hill, encompassed by a ditch. In the parish of Stoneykirk, co. Wigton, are three beautiful moats; the largest is 460 ft. in circumference at the base; its form is like that of a sugar loaf; its height 60 feet, with an excavation at the top. It is surrounded by a large circular ditch. Similar moats exist in the neighbouring parish of Inch; one is on the side of loch Ryan, of which it commands a full view; its circumference is 336 ft., height 60 ft., and diameter at top 78 ft.; the figure of it being round with a flat summit. FORSYTH, *Beauties of Scotland*, 8vo., Edinb., 1805, ii, 291, 309, 311, and 424. ANDERSON, *Account of ancient Monuments and Fortifications in the Highlands of Scotland*, in the *ARCHÆOLOGIA*, 4to., Lond., 1779, iv, 241-66. The *BUILDER Journal*, 1875, xxxiii, 232, describes the moated mounds at Cambridge, Towcester, Tempsford, Toternhoe, and Caerleon.

The word **MOAT** is now usually applied to the fosse or ditch around a fortification; it was often separated from the enclosed area, or from the exterior land, by a bank or mound. The side of the moat next the fortress is termed the *scarp*, and the other side the *counterscarp*. Alternate ditches and banks are the principal component parts of ancient British and other earthworks. Moats were often very wide and deep; and in that case a second cutting or moat (Fr. *cuvette*) formed in the bottom, is shown in some French works. The moat either contained water, or was left dry with ready appliances for filling it from a neighbouring lake or river.

MOATED HOUSE. The term given to a manor house or other important country residence, which in the fourteenth century was built with a moat or large ditch around it filled with water, to prevent sudden attacks from enemies; access to the building being obtained by a carefully defended bridge, or

by a drawbridge. Many such still remain in England and on the continent. The custom continued to the time of queen Elizabeth or later, and the moat often remains where the house has disappeared, as in the case of the palace of Richard, king of the Romans, at Beckley, Oxfordshire, of which no other vestige now remains to mark the site, beyond the uneven ground where the grass has grown over the ruins. In the village of Appleton, Berkshire, the moats of three houses still remain or may be distinctly traced; the parish is large and still consists of three separate manors. "The Mote", near Ightham, Kent, probably derives its name from the very fine moat by which it is still surrounded. Steeple Bumpstead, Lackly, and Haverill, in Essex, with one near Great Bealing's in Suffolk, are among the many other examples which might be cited.

MOCARABE, see ALMOCARABE.

MOCCHI (FRANCESCO), was a pupil of G. L. Bernini.

MOCCHIO, MOCCIA, or MOCCIO (MAESTRO), of Siena, was chiefly a sculptor; but at Arezzo he designed, 1356, the small church of S. Agostino, in which city Nicolo di Piero Lamberti became his pupil. At Florence he acted as sub-architect and sculptor at Sta. Maria del Fiore; and also built the church and monastery of S. Antonio now destroyed. At Ancona he designed the loggia for the merchants, since much altered; and decorated with sculptures, similar to those at S. Francesco, the door of the church of S. Agostino; and erected in it the tomb of fra Zenone Vigilanti, the bishop and general of the order. At Siena he erected the gate San Vienne or di Pispini (see Duccio); VASARI, *Lives*, 8vo., Lond., 1850, i, 322, s. v. N. d'Arezzo, and Duccio. 56. 73.

MOCCHIO, or MOCCIA (GIOVANNI SIMONE), was a pupil of G. B. Cavagni. He designed, 1600, the church Spirito Santo, at Naples, of which now only remains the door flanked by two columns, the front with the cupola having been rebuilt 1774, by M. G. Gioffredo. 8. 12. 36.

MODAIN or EL MADAIN. A village about twenty-two miles from Baghdad, in Asiatic Turkey, occupying the site of the ancient CTESIPHON, on the east bank of the river Tigris. It is now chiefly remarkable for the Tâk Kesra or Tauke Kesra described in that article.

MODEL. A word sometimes used in old writers for MODULE.

MODEL. This term designates the original work from which another is elaborated: thus when Robert Lozinga was about to rebuild his cathedral at Hereford, he is stated to have adopted the church at Aix-la-Chapelle as his model. MOLLER, in his description of the church of S. Elizabeth at Marburg, remarks, that there is a strong resemblance between it and many other churches in Hesse, namely those at Friedberg, Frankenberg, Wetter, Grünberg, and Alsfeld; all these appear to have had some model in common, which was probably the Elizabeth's kirche or conventual church at Haina; LEEDS's translation, 8vo., Lond., 1836, p. 104. IMITATION. COPY.

MODEL. A representation of a work executed or to be executed. A model of a church is often seen in the hands of an effigy representing the founder or other benefactor of a cathedral; as that in the south aisle at Hereford, supposed to represent bishop Braeos or Bruse, who died 1215. A mutilated figure in stone, some years ago removed from a niche in the tower of Durham cathedral, holds in his hand a church carved in stone of the Norman period. In Worcester cathedral, CARTER, *Ancient Arch.*, i, p. 54, in the spandril of an arch are two figures, examining a tablet on which is a design for a church. Affixed to the wall over the chancel arch of Brancepath church, Durham, is a large wooden tablet divided into squares, each of which contains an elaborate specimen of the paneling of the Decorated period. Can these have been the pattern pieces of an architect? is asked by RAINES and SALVIN, *Catterick Church*, 4to., Lond., 1894, p. 13-4, the contract (13 Henry IV) for which church does not refer to drawings, but

gives sizes and a description; Richard de Cracall, or Crakehall, was the mason employed.

Such models are also seen in sculpture, as on a boss at Norwich cathedral. KING, in Murray's *Handbook to the Cathedrals*, p. 137.

MODEL. The exact representation of a work on a small scale, according to which the work itself is to be executed. Models were probably made from a very early period to show the effect of the design for a proposed work, as more thoroughly conveying the effect of it when executed, than drawings, especially at a date when perspective was not understood. It is useful in conveying the effect of a proposed work to an unprofessional eye, and in assisting the workmen to understand the practical execution of very complicated buildings, by conveying a more accurate idea of the various parts than can in such cases be conveyed by the most careful drawings.

LEEDS, in *Public Edifices of London*, Supp. 8vo., Lond., 1838, p. 106, remarks that, "If models are in some respects far more satisfactory than working drawings, they are not so well calculated to guard against mistakes as to the appearance of a building, when beheld, as it of necessity must be, in combination with surrounding objects. In a model there is nothing to serve as a scale to the eye, and inform it directly and distinctly of the relative magnitude of the intended edifice.—Perspective drawings ought to accompany models in order to show what the actual appearance will be; but then it is requisite that they should be taken from the same points that the building itself will generally be viewed from, and also be made trustworthy in regard to effect and the shadows."

At Glastonbury abbey, a new foundation was laid in the year 942, and the offices were built after a model brought from France. A model was prepared *cir.* 1390 for Milan cathedral, which was for a long time in existence; another one was made about 1519.

As Salisbury cathedral was evidently commenced and carried out on one design, commencing from 1220 and ending 1260, no doubt a model was prepared beforehand of the general design. The same remark applies to Durham cathedral.

At Swaffham church, Norfolk, the north aisle built about 1474, and the tower 1507-10, are considered to have been paid for by John Chapman, a tinker, who "desired the workmen to show him their model, and to tell him what they esteemed the charge of the north aisle would amount to, &c."; NORFOLK TOUR, 8vo., Norwich, 1829, ii, 671; from Sir R. Twysden, *Remembrances*, published by HEARNE, p. 299. Again, the mason in his contract for the erection of Hengrave Hall, Suffolk, agreed to make the house "according to a frame which he had seen at Comby", which probably referred to a timber mansion, the timber of which when put together was called a frame. Fotheringay church was built after the chancel work. "Patterns", or models for the images on the tomb in Warwick chapel were to be "of timber"; for the glass, the patterns were "in paper". For the tomb of king Henry VII at Westminster, the "patrones" were "in timber". "Plat, plotte, or plot" probably meant a DRAWING. "Une fourme et molde" was made, 1395, by Henry Zeneley, for raising the walls of Westminster Hall. "The plaisterer should show you models of the ceilings," CALENDAR, &c. *Domestic series*, 1600, p. 511. "Thus much for the model of the palace," BACON, *Essay on BUILDING*, probably referring to the arrangements. "Module (i.e., model) for roof of the (old) banquetting house" at Whitehall, 25th June 1608, 5th James I, by James Acheson, cost £54; Add. MSS., 9045, f. 99. At Ghent in 1416 G. MARTIN, mason and master of the works to the city, made a model 3ft. long, of the gate of S. Pry, in duplicate, the sheriffs keeping one copy and himself the other. A model in wood of a proposed house at Audley End, Essex, is generally supposed to have been procured (*cir.* 1610) by the Earl of Suffolk, from Italy, at a cost of £500; of this model some mutilated fragments are still preserved, and from which it is supposed the

working drawings were made by B. Jansen or John Thorpe, or by both. In 1631 William Aytoune bound himself to the governors of Heriot's Hospital, Edinburgh, "to prosecute and follow forth the modell fram and building of the work". A model to be made for Berwick bridge, temp. James I, DEVON, *Issues*, 4to., Lond., 1836, p. 209, 302. Archbishop Juxon stated in his will 1663 that his executor was to be at the charge of finishing the Hall at Lambeth palace "according to the model made of it". The model of A. (Picconi) Sangallo's design for S. Peter's at Rome was made by A. Labacco, his pupil, at a cost of 4,184 crowns; it is preserved in the present church, and is itself a building deserving a description; the plan is a Greek cross. This and an elevation are given in Woods, *Letters*, 4to., Lond., 1828, i, 362. In respect of S. Paul's, London, it is recorded that Sir C. Wren, "the surveyor . . . made a very curious large model in wood, accurately wrought and carved with all its proper ornaments, consisting of one order, the Corinthian only (as at S. Peter's in Rome). This model was for many years kept in the office of the works at S. Paul's, in a shed built for that purpose; thence, after the finishing the new fabrick, it was deposited (together with the other models, and particularly one for the high altar, to consist of rich marble columns wreathed, &c.) over the Morning prayer chapel on the north side; where, it is hoped, such publick care will be taken, that it may be preserved, and, if damaged, repaired, as an eminent and costly performance, and a monument, among the many others of the skill of the greatest geometrician and architect of his time. (The original designs drawn in a large scale for the king's use, are extant.)"; WREN, *Parentalia*, 282.

His Majesty's commission for the rebuilding of the cathedral church of S. Paul in London, 25 Ch. II, 1673, states:—"We have caused several designs to that purpose, to be prepared by Dr. Christopher Wren, surveyor-general of all our works and buildings, which we have seen, some of which we do more especially approve and have commanded a model thereof to be made after so large and exact a manner that it may remain as a perpetual and unchangeable rule and direction for the conduct of the whole work." *BUILDER Journal*, 1858, xvi, 761. This model is now (1875) kept in the South Kensington Museum. LONGMAN, *The Three Cathedrals*, 8vo., Lond., 1873, p. 113, gives the design as approved by the king; and p. 111 the above-mentioned model of the so-called baldachino. The *Parentalia* also contains Wren's statement that he would "speedily perfect draughts and models" for the works of repairs at Westminster Abbey. From that time (the date of the warrant, 14 May 1675, for the commencement of the works), "the surveyor resolved to make no more models or publicly expose his drawings, which (as he had found by experience) did but lose time and subjected his business many times to incompetent judges," p. 283.

The commissioners for building fifty churches in the Metropolis as directed by queen Anne, had models prepared by various architects; these are still preserved in Westminster Abbey, over one of the chantries: three are as erected, but the others appear only as designs; several of the plans are given in the SURVEYOR, *etc.*, *Journal*, 4to., Lond., 1843, iv, 351, with the *Account* of them read at the Inst. of Brit. Architects, 6th Nov. 1843, by T. L. DONALDSON. In the vestry-room of S. Giles-in-the-fields, London, is still preserved the model of the church made 1731 by the architect H. Flitcroft. In the Bank of Ireland in Dublin is a model of it by Mr. Doolittle, except that the Ionic order has been preserved throughout. 1. 2. 14.

MODEL TO FULL SIZE. Several instances have occurred of models being set up the full size of the intended structure. These have not always been carried into execution subsequently. Such for instance was that of the Elephant fountain at Paris, erected 1808 (existing 1824) near the spot where the Bastille stood: it was to have been 72 ft. high, with a tower on its back forming the reservoir. It was formed of timber covered with plaster of Paris. The architects were Celerier and Alavoine, assisted by Denon. "The greatest architects often had

models made under their own inspection of the same size as for execution, to assure themselves of the perfection of their designs, or at least of the more essential parts of them, particularly of those parts which are repeated in the structure. As for instance, Bernini for the colonnade of S. Peter at Rome; L'Escot for one of the pavilions to the large court of the old Louvre; Perrault for the triumphal arch of the gate S. Antoine; and Mansard for the larger part of the frontage of the château des Maisons. Even with this precaution there must always be a great difference between the work as a whole, and a few of its parts seen in full size; because a few columns with their entablatures and their accompaniments show at the utmost but a portion of the details, but never the effect of the general masses on which the success of the design depends; in the same way, an isolated pavilion in a model, to be afterwards connected to a wing of a building, shows often but very imperfectly the correspondence which ought to exist between it and the entire work. The same must be said of the relation of an entablature, only placed upon a few front columns, and of the relation that ought to exist when a certain portion of them has other work over them. Finally, a large frontal should have a different dimension to a small one; so also should all the other portions differ according to proportion, point of sight, elevation, and distance; from which it may be concluded that it is not only advisable to make at first a general model of the building to a moderate scale, but to make also models of the principal parts, such as the exteriors, the colonnades, the gateways, etc.; in the interior, the staircases and the galleries, with their decorations, such as capitals, cornices, modillions, consoles, and other essential parts, so as to be able to judge of their effect when actually placed in the building. The parts of architecture and of sculpture destined to be placed at the summit of a building must be treated with much more boldness than when they are situated near to the spectator either on the exterior or in the apartments." BLONDEL, *Cours*, 8vo., Paris, 1771, iv, 160.

MODEL DWELLINGS. See COTTAGE. LODGING-HOUSE (MODEL). FARM BUILDINGS. WORKMEN'S DWELLING.

MODENA. (The ancient MUTINA.) The capital of the state of the same name, in Italy. It existed under the Etruscans, and rose to great splendour under the Romans, as in the time of Cicero (106-43 B.C.). It is walled, has a citadel by C. G. Guarini, and is built with great regularity, the spacious streets generally lined with arcades. The greater portion of the new town sprang up during the nineteenth century. A canal affords a boat communication with the river Panaro and the Po, and by the latter river with Venice.

The cathedral, dedicated to the Virgin and S. Geminiano, is a good specimen of Romanesque architecture, designed it is supposed by Guglielmus Lanfrancus, or LANFRANCO FACCI, or Romengardi, and it was commenced 9th July 1099, according to an inscription (MURATORI, *Script. Rer. Ital.*, vi, 89, etc.), and others as stated s.v. LANFRANCO. It was consecrated 1108, and perhaps reconsecrated by pope Lucius III, July 1184, after the exterior had been modernised and the groining added inside (STREET). The west portal, two stories high, and a screen to the lofty crypt under the whole east end with arches on slender shafts, both have columns standing on lions. A gallery on each side of the nave serves for women. There is an immense and gorgeous wheel window in the west façade. HOPE, *History*, 8vo., Lond., 1840, p. 278 and pl. lxix, gives the east end. Bern. Crist., and Lor. Lendenari executed works in marquetry, 1465. The campanile on the north side, called "La Ghirlandina", from a garland in bronze which surrounds the weathercock, 315 ft. high, is one of the four of which Northern Italy is justly proud. The lower part was completed 1224, and the upper by Arrigo Campiglione 1319-22; it is somewhat defaced by modern additions. *Illustrations*, Campanile, pl. 26; Gally KNIGHT, *Eccles. Archit.*, fol., Lond., 1842, i, pl. 40; STREET, *Brick and Marble*

Arch., 8vo., Lond., 1855; OSTEN, *Bauwerke*, etc., fol., Darmstadt (1846), gives plan, sections, etc., pl. 31-5; *Il duomo*, etc., 8vo., Mod. 1845. There are about twenty-five churches, of which S. Agostino (cir. 1660) by G. G. Monti is converted into a gymnasium; S. Vincenzo by C. G. Guarini (cir. 1660) according to some writers; S. Gaetano by the same, (TIRABOSCHI); S. Domenico the court church; S. Francesco (query desecrated); and del Carmine, are among the most noticeable. The Theatine monastery is by Guarini. *Notizie storiche ed artistiche della Chiesa e del Monastero di S. Pietro in Modena* (1828), 8vo., Mod. 1851; from the *Annuario Stor. Mod.*, vol. i, Sez. i.

The vast ducal, now royal, palace, a princely building, was commenced in the seventeenth century, having later additions, of which the façade (cir. 1840) is by Bartolomeo Avanzi of Rome. There is a court in front with a colonnade, a grand staircase, a collection of paintings exceeding 500 specimens arranged in thirteen rooms, a museum of curious mediæval sculptures, and a library of 100,000 volumes and 3000 MSS. Six plates were published of it by GADDI, fol., Mod. 1828; AMICI, *Descr. de' quadri del ducale appart. di Mod.*, 4to., Mod., 1784. There are also the theatre, baths, colleges of law and medicine; workhouse for prisoners formed in the citadel; and *monte dei Pegni* in a large palace containing the offices of the charitable establishments, and the *museo Lapidario*, in which is now the famous group in painted terra cotta by Begarelli, formerly in the church of S. Agostino or S. Francisco. 14. 28. 50.

DALL' OLIO, *Pregi del regio palazzo di Mod.*, 4to., Mod., 1811; 1821. MAZZONI AND BEGARELLI, *Le Opere di celebri plastici. E le pitture eseguite nelle Sale del palazzo della comunità, da N. Abati, B. Schedoni, ed E. Abati*, fol., Mod., 1823. SERRISTORI, in *Statistica d'Italia*, 8vo., Fir., 1836. TIRABOSCHI, *Notizie di Pittori, etc., degli stati di Mod.*, 4to., Mod., 1786. NEIGEBAUER, *Handbuch für reisende in Italien*, 12mo., Leip., 1846. VALÉRY, *Voy. en Italie*, 8vo., Paris, 1838; transl. by C. E. Clifton, 8vo., Paris, 1842. MILLIN, *Voyage dans le Mil.*, 8vo., 1817.

Sassuolo, in the environs, was the ducal residence and gardens; and the fortress of Rubiera, formerly the principal stronghold of the state, but now dismantled, is on the road to Reggio; there are some remains of a Roman bridge over the river Secchia.

MODENA (BARTOLOMEO DA), was 1416 the *ingegnere* (i.e., architect) of the crypt della Gandoglia, in the cathedral at Milan. This was perhaps rebuilt by P. Pellegrini 1584; by G. Malojo, cir. 1605; or by P. Pistagalli in 1817. 27.

MODENA (FILIPPINO DA) or DEGLI ORGANI, was from 8th January 1400 to 7th February 1434, directing the works of the cathedral at Milan. In one document he is called "Ingegnerius generalis dictæ fabricæ". 27.

MODENA (NICOLÒ DA), properly Nicolo Abati, or Abbati, and usually called Nicolo dell' Abate, a painter, was born at Modena, 1509 or 1512. In 1552, being then at Bologna, he accompanied Primaticcio to France. His architectural works are stated to have been the old château at Meudon, built for the cardinal de Lorraine, and the tomb of François I, at S. Denis; but these are usually attributed to DE LORME; and the decorations to the apartments in the palace at Fontainebleau. He died at Paris 1571, according to NAGLER; others say at a very advanced age. 14. 76. 93.

MODERN. The explanation of this term, 1703-36, is as follows: "This word in its genuine meaning is only applicable to such architecture as partakes partly of the Gothic, retaining somewhat of its delicacy and solidity, and partly of the antique, whence it borrows members and ornaments without any proportion or judgment". 4. 41.

The term is applicable to any current style at any given period.

MODILLION. An ornamental member placed under the corona in the cornice of the Corinthian and Composite Orders, resembling a small bracket placed horizontally, that is, with its

back against the soffit of the part it supports; in which respect it differs from the console, which is placed upright with the larger scroll uppermost. Although sometimes omitted, as in the temple of the Sybil, the temple to Faustina, and the portico of Severus, it is indispensable to the character of the order, being quite as much distinguishing marks of its entablature as MUTULES are in the Doric, and DENTILS in the Ionic, cornices. A modillion should be placed over the axis of the column, and it should be placed about double its own breadth apart, so that the soffit is square; this is sometimes worked into a sunk panel, with a rosette filling the inner sinking. VITRUVIUS apparently does not use the word *modillion*, employing *mutule* for it.

The curved face of the modillion is generally ornamented with a leaf; but it is sometimes very plain, being cut in the form of a *cyma reversa* as in the fourth order at the Coliseum, and in the Composite order at Myra; or converted into a block slightly ornamented on its face, as in the frontispiece of Nero, where it is square and has several faces. Dentils are sometimes placed beneath the modillions, with moldings between, where great richness is desired, but they are then very inappropriately situated, as in the example of Jupiter Stator at Rome, and in the Arch of Constantine, where both occur also in the impost. 14. 25.

The article ANGLE MODILLION explains why they were so placed. JUNIUS, *Nomenclator*, 12mo., Lond., 1585, uses the word *modillon* for corbel or tassel; and BATISSIER, *Monumens*, pp. 409-32, uses *modillon* and *corbeau* indiscriminately for corbel and cantilever, and *console* for modillion and cantilever. HOPPE, *History of Arch.*, has in many places used modillion for medallion.

Peruzzi, in the cornice of the Doric Order at the palazzo Pietro Massimi at Rome (pl. 285), has added the plain modillions, which have some analogy with the mutules of that Order. The exterior door of the palazzo Sacchetti (pl. 94), shows another good example of the employment of modillions. But as Sangallo died ten years after Peruzzi, without having completed the palazzo Sacchetti, the priority ought to be given to Peruzzi; LETAROUILLY, *Edifices de Rome*, fol., Paris, 1840, p. 587.

The modillions at the Pantheon at Rome, are not placed over the centres of the columns, neither inside, nor in the portico; the one in the apex of the pediment is formed by two united; there is one less on the left than on the right side; the sides of those within the building point to the centre. The double modillions (at the angles) and the dentils in the entablature of the high altar in the church of S. Gennaro at Naples, being doubled, have a very bad effect. Also in the breaks at the angles of the dome in the church of Sta. Trinità delle Monache at Naples. At the church of S. Geremia at Naples there is a modillion over each Corinthian coupled pilaster, and two modillions near together, between them; the effect of which is not successful. REVELEY, MS., at R.I.B.A.

DALY, *Revue*, ii, 232, notices an entablature at Autun in France, of the Gallo-romaine period, in which the character and form of each modillion is different, and one is placed at the angle. At the baptistery at Poitiers he shows them (xiv, 178), cut like a bird's beak molding. BATISSIER, *Elements d'Archéologie Nat.*, 8vo., Paris, 1843, p. 409; 432 also remarks upon the early mediæval imitations.

The modillions in the chief cornice of the arch at Orange are remarkable, but occur also both in the tower of the Winds at Athens, and at the Maison Carrée at Nîmes. These modillions are carved the reverse of those usually seen in ancient edifices, that is to say, their most swelling portion instead of resting against the wall to form a console, is on the contrary placed under the corona (Fr. *larmier*), a very reasonable arrangement if that part of the decorations be considered the result of timber construction, and as indicating the projecting ends of rafters. DALY, *Revue Générale*, ii, pp. 228-30, 323.

MODLIN. A town in Russian Poland, now called Novo-GEORGIYEVSK.

MODULE. (Lat. *modulus*, dimin. of *modus*, measure, proportion). A unit or standard of length for determining the proportions of a work of architecture and the relations which exist between its different parts, and to which all such dimensions are referred. This unit is generally the semidiameter of the column and is divided into parts or minutes. Thus by the use of the module, however much the actual dimensions of the design may vary, the proportions remain the same. It is the term used by Vitruvius, iv, 3, when describing the proportioning of a Doric temple; one part of the twenty-eight or forty-four into which the front is to be divided "is called a module, by the Greeks, *ἐμβάτης*, from the module so found the distribution of all the parts is regulated. The thickness of the columns is to be equal to two modules", and so on. Hence the diameter, or semidiameter of the column at the base, has usually been taken by the architects of the Revival as their module; and this was subdivided into parts or minutes. Vignola divided his module, which is a semidiameter, into 12 parts for the Tuscan and Doric, and into 18 for the other orders. The module or semidiameter of Palladio, de Cambray, Disgodeltz, Le Clerc, and others, is divided into 30 parts or minutes in all their designs of the orders. Some writers have divided the whole height of the column into 20 parts for the Doric, 2½ for the Ionic, 25 for the Corinthian, etc., one of which is taken for the module by which to regulate the other details. Vitruvius makes the module equal to the diameter for the other orders. Perrault reduces the greater module to a third part, so as to determine the different dimensions of the order, the pedestals and other portions without a fraction. 1.

JOMARD, *Descr. des Antig. d'Antropolis*, in the *Description d'Egypte*, 8vo., Paris, 1821, iv, 101-2, describes the proportions of the temple from the height of the column being divided into ten parts, of which one part is exactly "the module, or half the lower diameter"; and refers to his *Mémoire sur le système métrique des anciens Egyptiens*, chap. iv. A temple on the south side of the island of Elephantine was proportioned on the same module; i, pp. 175-213.

ARÈS, *Nouvelle Théorie du Module, déduite du texte même d' Vitruve, et application de cette théorie à monuments*, 4to., Nîmes, 1862; and his other similar treatises. **PROPORTION.** VIOLETTÉ LE DUC, *Dict.*, art. Sculpture, pp. 238-9, describes the scale on which the architects of the middle ages designed the profiles and ornaments.

MODULUS OF ELASTICITY. A term in relation to elastic bodies, expressing in a constant number the weight which would draw them to a certain length without destroying their elastic power. GREGORY, *Mathematics for Practical Men*, 4th edit., 8vo., Lond., 1862, p. 381. At p. 378 will be found a table of the MODULUS OF COHESION, or the length in feet of any prismatic substance required to break its cohesion, or tear it asunder. 1.

MENIANUM. The name given in Roman amphitheatres to the first or inner row of seats.

MOER (MEISTER THEODORIC), called *archilapicida*, was engaged on the Victorskirche at Xanten, about 1455. 92.

MOESTEL (HANS), burghmaster of Merseburg, finished the cathedral there in 1540. 92.

MOGHREB-EL-AKSA. The Arabic name of Morocco.

MOGNON (PIERRE DE), a Cluniac monk attached to the monastery of île de Aix, who, in the middle of the twelfth century, was charged to build the church of S. Barthélemy at La Rochelle. ARÈS, *List. de la Rochelle*, 4to., 1756.

MOGUL BUILDINGS. As the interest and utility to the architect in studying the works constructed in India by the Mogul emperors must in a great measure depend upon some approach to a chronological arrangement, it is desirable to supply here, because they were kings of Delhi even when their authority was falling from their hands, a list of their dates of

accession: Humayoun, 1531; Acbar, 1556; Jehangir, 1605; Shahjehan, 1628; Aurungzebe, 1658, Shah Aloum I, 1707; Ferokhsere, 1712; Mahmoud III, 1719; Ahmed, 1747; Aloumgir II, 1753; Shahjehan II, 1756; Shah Aloum II, 1761, who became virtually a dependent, like his son, Acbar II, 1806, and his successors, upon the English. (DELHI) HAMILTON, *Gazetteer*, s.v. Delhi. BERNIER, *History of the Mogul Empire*, 12mo., 1676. ORME, *Hist. fragments*, 8vo., 1782; 1805.

MOGUNTACUM of the Romans, see MAINZ, in Hesse Darmstadt.

MOHAMAD. See MAHOMAD (MAESTRE).

MOHOWERANGS. A valuable wood of New Zealand, also called AKE-AKE. 71.

MOILON. A French term used in some books of the eighteenth century, for a sort of masonry formed of small stones where the courses are equal, well squared, and the beds or edges rusticked. It is the same as the French *moellon*, rubble masonry. VIOLETTÉ LE DUC, *Dict.* 25.

MOINE, or MOYNE (JEAN PHILIPPE LE), was born about 1750. He obtained 1767 the second prize of the Academy at Paris, and went to Rome, where he remained so long that on his return he was called "le Romain", perhaps to distinguish him from another of the same name. He practised at Paris, where he (1780) designed the house for M. d'Argenson in the Champs Elysées, given in pl. 2 of KRAFFT, *Plans, etc., des Maisons*, etc., fol., Paris (1801-2); and in pl. 23-4, the house, 1790, arranged round one half of a circular court for M. Caron Beaumarchais, near the porte S. Antoine (also given in LERAND AND LANDON, *Descr. de Paris*, 8vo., Paris, 1809, iv, 31; the gardens laid out by Bellanger); pl. 86 gives the *salon*, to which he is styled "Le Moine le jeune." KRAFFT, *L'Art de la Charpente*, fol. Paris, 1802-5, gives, pl. 17, the plank roof on de l'Orme's system to the nave of the church of S. Philippe du Roule at Paris by Chalgrin, as by "Niquet, carpenter, and Lemoine, architect"; and also a "comble brisé, dit à la Mansard" of planks, à la Rapée, near Paris, 1785. He died about 1806. 68, 69.

MOIST STOVE. See BARK STOVE.

MOISTURE. See DAMP, which article is concluded with the note: "It is considered desirable to defer to the article 'moisture' the consideration of remedies for the visible effects of damp." DRYING CLOSET; EFFLORESCENCE; DRY AREA; GAS; HUMIDITY, etc. Where materials are always soaking in damp as fast as they dry, such as the south country building stones, they must be lined with brick; and in exposed situations salt water has been found to be driven through an 18 in. wall.

A patent was taken out 19 Oct. 1857, by V. Peau, for coating surfaces with glass made adherent to sheets of wood by means of a composition described therein. Another, 6th Feb. 1858, by L. E. Candelot, being an anti-nitrous cement, also applicable to rendering damp surfaces impervious, and to flagging, etc.; it consisted of a solution of boiled oil, colophony, turpentine, wax, stearine, liquid india-rubber, and a powder consisting of glass or silice, chalk, grey oxide of zinc, talc (or preferably sulphur), and lime. This composition could be modified, and several others are described. Newton's preparations for coating roofs, etc., to render them impervious to wet, are stated in *BUILDER Journal*, xvi, 186. Gay and Co.'s damp proof solutions and patent impenetrable paint, have been in use since 1870. Stent's composition for preparing newly plastered or damp walls for papering was advertised later.

Although all trials of covering damp walls with tar, pitch, glass, leaden plates, etc., have failed, asphalte has proved perfectly successful. The process is to scrape off any plastering, and fill up the crevices with a thin layer of mortar, after which the walls are to be painted with fluid asphalte as prepared by Mr. Simonis at Cologne. Over this a covering of mortar is to be laid perfectly even. After the mortar is set and dried, wash paper is pasted thereon, and then the paperhangings. The

fluid asphalte, used cold like oil paint, requires only a few days to be perfectly dry, when the mortar can be put over it. It is not affected by damp, nor can damp pass through it, and the stained paper retains its original appearance even on walls before thought irremediably wet; as reported in the *COLOGNE INDUSTRIAL JOURNAL*.

A test of the dampness of rooms may be obtained by placing 500 grains of quicklime on a plate in the apartment, and if at the end of twenty-four hours this substance, which absorbs moisture very greedily, has not increased in weight by more than one fortieth or one fiftieth, the apartment may be considered fit to live in. In a damp or newly-built room it will increase in weight as much as five per cent. "Sulphuric acid in an earthen vase, placed in a damp room, will soon absorb vapour;" Dr. DICKSON, in *CIVIL ENGINEER*, etc., *Journal*, 1849, xii, 30. When the damp proceeds from deliquescence, in the case of muriate of soda, etc., in intimate combination with sand in the water, it is only necessary to wash the wall with a strong solution of alum. This converts the deliquescent salt into an efflorescent one, and the cure is complete. Alum may be added to the plaster in the first instance. Same *Journal* 1847, x, 296. Or the walls may be washed with sulphuric acid, which effects the same result.

Dark wall papers absorb more damp, as in condensation, than light ones, but at the same time they absorb more light; *BUILDER Journal*, 1858, xvi, 214, 248-9, etc.

At S. Geneviève at Paris, when paintings were to be executed on a stone wall, the surface of it was first scraped to remove all paint and size; about a square yard at a time was then heated by means of a portable furnace, and a composition was applied, at a temperature of about 100 deg., with large brushes. The first wash being absorbed, a second was added, and so on till the stone ceased to absorb. To promote absorption the stone is to be warmed repeatedly according to its porousness, the heat being in every case as great as possible but not so as to carbonize the oil. The surface being at last smooth and dry, a coat of white lead mixed with oil is applied and the painting is executed thereon. The composition consists of one part wax and three parts oil, boiled with one tenth of its weight of litharge; Appendix to *Second Report of the Commissioners of the Fine Arts*, 1843, reprinted in *CIVIL ENGINEER*, etc., *Journal*, vi, 382.

A cement which will withstand a moist climate is given thus:—Mix one bushel of lime with 15 gallons water, and half bushel of fine gravel sand, with 3½ lbs. of copperas, dissolved with hot water and kept stirred while mixing and in use; enough should be made for a day's use, as the colour is not easily matched, and should be mixed the day it is used. ACKERMANN, *Repository of Arts*, etc., 8vo., Lond., 1818, v, 8.

A preparation for curing damp walls, and suitable for use in flooring kitchens, and other purposes where the prevention of wet is necessary. Boil two quarts of tar with two ounces of kitchen grease for a quarter of an hour in an iron pot; add some of this tar to a mixture of slaked lime and powdered glass which have passed through a flour sieve and been dried completely over the fire in an iron pot, in the proportion of two parts of lime and one of glass, till the mixture becomes of the consistence of thin plaster. It must be used immediately after being mixed. Only mix enough at a time for one square foot of wall, as it quickly becomes too hard for use, and continues to increase its hardness for three weeks. Great care must be taken to prevent any moisture from mixing with the cement. If the wall be merely damp it will be sufficient to lay on one coating of the cement about an eighth of an inch thick; but should it be more than damp or wet, it will be necessary to coat it a second time. Plaster, made of lime, hair, and plaster of Paris, may be afterwards laid on the cement. *BUILDER Journal*, iv, 100, xiv, 197. See BRICKWORK (WATERPROOF) for Sylvester's process.

It is stated that wood may be made impervious to moisture

by applying a composition formed by melting one part in weight of resin, in twenty-four parts of train oil, and one part of sulphur. When it has become quite fluid and well combined, as much ochre rubbed up in linseed oil is to be added as will give any tint required. The mixture is applied while hot, care being taken that it is put on as thinly as possible; and the application is to be repeated after a couple of days. *ILLUSTRATED BUILDERS' JOURNAL*, 4to., Lond., 1865, p. 303.

MOL (HENRI DE), called Coeman, succeeded Gilles Vandenberg as architect to the cathedral at Bruxelles, at the period of the erection of the ailes. He died in 1469 or 1470. *WATERS, Guide de Bruxelles*, 8vo., Brux. 1855, p. 57.

MOLASCH (WILLS). This name of a pupil is inscribed in a chapel in the south-west transept of Christchurch, Canterbury; see CHILLENDEEN (THOMAS).

MOLASSE. (Ger. *Weicherstein*). The French name for a soft stone used for building; it is found in all parts of Europe; in Brittany, Normandy, Languedoc, Provence, etc., in France. It belongs to the miocene formation, assumes a great variety of forms, and is occasionally bituminous. It is obtained in different thicknesses, of a blue or red colour: and that sort found in Dauphiny is fire resisting.

MOLDE, see MOULD.

MOLDERAN (HANS), built, 1404-16, the middle portion of the Stiftskirche at Eimbeck, in Hanover. 91.

MOLDING, see MOULDING.

MOLET (.....) see MOLLET.

MOLFETTA. A town and seaport near Bari, in Southern Italy. The see was founded in the tenth century. The buildings are erected of a white stone resembling marble. The cathedral, dedicated to the Assumption of the Virgin, is given in SCHULZ, *Denkmäler der Kunst des mittelalter in Unter Italien*, fol., Dresden, 1860. 50. 96.

MOLINOS (.....), also written Moulineau, born 4th June 1743 at Lyon, became architect to the city of Paris and to the département. He restored and altered, 1801, the hôtel de Ville at Paris, designed by Boccadoro, to which edifice Molinos annexed the chapelle de la Communion (after altering and redecorating it) which had been designed by Jean F. Blondel in the church of S. Jean en Grève in the rue du Martroi; *LEGRAND AND LONDON, Nouv. descr. de Paris*, 8vo., Paris, 1808, i, 155, ii, 85-7. As master carpenter, he erected the laminated rib roof to the Halle-au-blé at Paris, 200 ft. diameter; it was burnt in 1802; *KRAFFT, Charpente*, fol., Paris, 1805, pt. 2, pl. 71. J. G. LE GRAND having entered into partnership with Molinos, they wrote five *Mémoires sur les Sépultures*, 8vo., 1804; and were associated, as architects to the public monuments, with Poyet in the removal of the fontaine des Innocens to its present site. The garden by them in the rue des Amandiers is given in *KRAFFT, Les plus beaux Jardins*, fol., Paris, 1810, ii, 3. The théâtre Feydeau at Paris 1791, afterwards the théâtre de l'Opera Comique, and destroyed for the place de la Nouvelle Bourse, is given in *LEGRAND AND LONDON*, iii, 95. Molinos published *Le Grand's Essai*, being the text to Durand's *Parallèle*, and added a memoir of his friend to the third edition, 8vo., 1810.

Among the other works by Molinos, are the pulpit to the church of the Assumption at Paris: 1809, the marché S. Honoré on the site of the Jacobin convent; it was of wood, and made place for the iron structure by M. de Méindol; and 1809-11, the halle au vieux linge, raised in the enclosure of the *ancien Temple*. As architect to the museum of Natural History, he studied to enlarge the buildings, but only a portion of his plan was executed; among them was the great *serre chaude* in the Jardins des Plantes, given in *KRAFFT, Choix de Maisons*, etc., fol., Paris, 1838, pl. 66, the wall over the arches being in opus reticulatum; likewise the house and jardin à l'Anglaise for M. Julien at Epinay near Paris; *KRAFFT, Arch. Civile*, fol., Paris, 1812, pl. 71; and the fountain and public washing place at Vitry-sur-Seine, in *NORMAND, Paris Moderne*, 4to.,

Paris, 1849, iii, pl. 80, is by Molinos, but it has the date 1842 upon it. His last work was (1829-31) the marché de Popincourt, rue Mémilmontant. He composed and carried out all the fêtes given by the city of Paris under the empire and the restoration; was elected, 14th November 1829 a member of the Institute at Paris; and died at Paris, 19th February 1831. QUATREMÈRE, *Not. Histor.*

MOLLER (GEORG), born 22nd January 1784 (1780 or 1786) at Diepholz, in Hanover, became 1807 a pupil of Weinbrenner at Carlsruhe, and visited Italy, returning 1810 to Germany, when he was appointed *hofbaumeister* to the grand duke of Hesse. He designed at Darmstadt 1817 the casino; 1819, the opera house, burnt October 1871; 1824, the Roman Catholic church, a brick building in the form of a rotunda, the extreme internal diameter of which is 135 English feet (164 Darmstadt feet), with a peristyle of twenty-eight columns supporting a dome 102 ft. in diameter, and of timber on de l'Orme's system, the height to the springing of which is 48 ft. and to the summit 102 ft. The internal diam. has also been given in error as 138 Rhenish ft.=141 Eng. ft., 173 ft., and even 187 Eng. ft. In 1826 he designed the chancellerie also in that city; in 1827 the Roman Catholic church at Bensheim; at Mainz, the theatre opened 21st Sept. 1833, being the first attempt at adopting the form of the ancient theatre for the exterior; 1828-33, the iron cupola of the east tower of that cathedral, 44 ft. 3 ins. in diameter and in height; and also the restoration of that portion of the edifice: 1837-40 the palace for the duke of Nassau at Wiesbaden; restored the château of prince Metternich at Johannisberg; and built the viaduct over the valley de Goels near Aix-la-Chapelle. In 1844 he was appointed director-general of buildings in Hesse Darmstadt.

He published *Denkmäler der Deutschen Baukunst*, 137 pl., fol., Darmst., 1815; 2nd edit. 1821; a third volume was edited by GLADBACH, fol., 1851. The text was translated by LEEDS, *Essay on the Origin and Progress of Gothic Architecture*, 8vo., Lond., 1824; and enlarged in *Moller's Memorials of German Gothic Architecture*, 8vo., Lond., 1836: the interesting *Original Zeichnung des Domes zu Köln*, 9 plates, fol., Darmst., 1816, 1818, and 1837, text 4to.: with HEOER, he published *Entwürfe ausgeführter und zur Ausführung bestimmte Gebäude*, 29 pl., fol., Darms., 1825-31, which gives the opera house and church at Darmstadt; and *Beiträge zur Lehre von den Constructionen in Holz und Eisen*, 6 pl., fol., Darms. 1833-43, edited by H. Ritgen, describing the laws of architecture in the middle ages. He was likewise appointed chief councillor of buildings in Hessen, received the grand ducal order of Louis, was made a knight of the royal Hanoverian order of Guelph, and elected a member of the Royal Prussian Academy of Arts at Berlin. He died 13th March, 1852, and was buried in the cemetery at Darmstadt. A monument was raised to him by his pupils, among whom were Franz Heger, Lerch, Hessemer, and André. FOREIGN QUARTERLY REVIEW, No. 27, Art., *The present school of Architecture in Germany*. ENGLISH CYCLOPEDIA, 1856-7. 68. 112. 113.

MOLLET and MOLET (ARMAND-CLAUDE), son of Charles Mollet (a son of Claude Mollet, architect of the royal gardens, born 1563), architecte du roi, and controleur des bâtimens du roi au département du vieux Louvre, obtained 1692 the survivorship, by consent of his father, of the office of master of the gardens at the Louvre. He designed about 1718 the hôtel for M. le duc d'Humières, rue de Bourbon, given in BLONDEL, *Arch. Franç.*, fol., Paris, 1754, i, 273; 1718, the hôtel for prince Louis de la Tour d'Anvergne comte d'Evreux, faubourg Saint Honoré; after whose death in 1752 it was bought by Madame la Pompadour, for whom it was altered by L'Assurance; in 1770 it was occupied as the hôtel des Ambassadeurs extraordinaires, and in 1791 the palais d'Elysée for Louis XVI; BLONDEL, iii, p. 156 and plates; BRICE, *Nouv. Descr. de Paris*, 12mo., Paris 1725, i, 298; the *avant cour* is given in BLONDEL, *Cours*, 8vo., Paris, 1772, iii, 117, pl. xix:

the alterations to the palais Mazarin for the hôtel de la banque royale et de la compagnie des Indes, of which there exists only the entrance gateway in the rue Neuve des Petits Champs (BLONDEL, iii); and the château de Stain near S. Denis for M. Belanger, engraved by Mariette in six plates.

Mollet was admitted a member of the Academy of Architecture 1699, and died 1720.

As ANDRÉ ARMAND MOLLET worked with his father, some of the above works may be attributed to him. He was elected in the Academy 1718, was architecte du roi, and as one of the four contrôleurs at Versailles he had the département des dehors du château et des bâtimens appartenans à sa majesté dans la ville de Versailles, with an inspector, M. Galley in 1756. He died in 1758.

His son LOUIS FRANÇOIS was admitted into the academy in 1734, and died 1747. LANCE, *Dict. Biog.*, 8vo., Paris, 1872. 5.

MOLOSSIUM MARMOR. See FIOR DE PERSICO.

MOLTENO (GIOVANNI), was consulted 1503 about the works at the cathedral at Milan. 27.

MOLTON (John), master mason at Hampton Court in 1531, was paid one shilling per day; accounts 27 Henry VIII, 1535-6, as stated with other wages in EDINBURGH REVIEW, April 1839, p. 103. See MULTON (JOHN).

MOLYNEUX (WILLIAM), was born in Dublin 1656. He was appointed chief engineer and surveyor of the works there, and in 1685 elected a member of the Royal Society. He settled at Chester, but afterwards returned to Dublin, which he represented in Parliament. He died 1698, aged 42 years, and was buried in S. Audeon's church, where there is a monument erected to him. He contributed papers to the PHILOSOPHICAL TRANSACTIONS. WARBURTON, *Dublin*, 4to., Dublin, 1818, p. 1192.

MONA OR ANGLESEA MARBLE. A remarkable and beautiful variety of the English marbles. It is of a greenish hue, and in some instances veined with green (oxide of copper). The colours are greenish black, leek green, and sometimes purple, irregularly blended with white, but they are not always seen together in the same piece; the white part is limestone, the green shades are said to be owing to serpentine and asbestos. It takes with ease a good polish, which in interior work is retained. The white and the grey veined marbles retain their mouldings in exterior work, being hard; and the black slate or marble is now used in ornamental works, such as tables with painted decorations, and for other domestic purposes. M. G. Bullock of Liverpool, discovered a few years since (as stated in May 1815), in the centre of the island, and about seven miles from the Paris mountain, some marble quarries containing two beds of rocks, the one resembling in colour and effect the Oriental porphyry, and the other the verd antique. He established 1815 a factory in London for articles in that material and in serpentine, at a price lower than statuary marble, and useful especially for chimney pieces, slabs, etc., as it would retain both colour and polish with a heat that would reduce statuary to powder. ACKERMANN, *Repository of Arts*, 8vo., Lond., 1815, xiii, 278; and 1816, ii, 243. 1.

The town hall at Birmingham 1832-5 is erected of Anglesea marble of a greyish white tint; and the piers of the Britannia bridge over the Menai Straits, are composed of blocks of Anglesea marble, 25 ft. long, 4 ft. wide, and 2 ft. thick, with others of a larger size.

MONASTIC BUILDINGS. The houses built by the regular orders were, strictly speaking, called *conventus*, whence CONVENT; but by various convertible names it was called monastery or minster if inhabited by monks vowed to the cloister; or FRIARY if the houses of the preaching or mendicant orders—HOSPITAL if intended also to receive pilgrims, or the sick and infirm; and PRECEPTORY for the military orders, as templars and hospitallers. If the monastic building was the residence of an abbot or abbess, who held similar rank

to that of a bishop, it was also called an ABBEY; if of a prior (who acted as a dean, and was subject to the visitation of a bishop or abbot), it was called a PRIORY, just as the seat of a bishopric is called a CATHEDRAL. An assembly of female votaries was called a MYNCHERIE or NUNNERY. A small conventual establishment, either for the superintendence of granges or farms, or for change of air for the sick, was called a CELL: thus Tynemouth priory was a cell to the abbey of St. Alban's. If the abbot had a right to a seat in Parliament it was called a MITRED ABBEY, as he ranked ecclesiastically with bishops. It is curious how the buildings have retained certain names. Ripon, which was originally a monastery, but became a college of canons at the time of the conquest, is still called a minster; this is also the case with Wimborne; while Worcester, which was originally founded for secular canons, and was made a monastery by Wolstan, is still called the "college". The only exception is that of Southwell, which is commonly called a minster, though it always was a collegiate church. This, however, is only a popular error, as in all the charters it is correctly named. The Jesuits, who are not subject to monastic rule, call all their buildings colleges. Besides this difference, a small number might form a college—"tres faciunt collegium" is an old maxim, while thirteen was requisite to form a convent, the number representing our Saviour and the twelve apostles: this rule is at least as old as the time of Chaucer (see the *Sompnoure's Tale*). FREE CHAPELS, attached to great houses, or built for the souls of founders, or in places of danger, as near fords, morasses, or bridges, were sometimes colleges, but this of course depended on their establishment.

The origin of the monastic institution is treated in GIBBON, *Decline*, etc., 8vo., London, 1854 edit., ch. xxxvii; and in WALCOTT, *Sacred Archaeology*, 8vo., Lond., 1868. *A. A.

The buildings comprised in a monastic establishment are named s.v. ABBEY. A list of the rooms is given in FULLER, *Church History*, 8vo., Lond., 1845, iii, 307. Two ancient plans exist. I. That of Christchurch monastery at Canterbury, published in *Vetus Monumenta*, made by Eadwin in the twelfth century, and preserved in the Trinity College library at Cambridge: a memoir was read, with an original survey, by Professor WILLIS at the SOCIETY OF ANTIQUARIES, 9th June, 1853. In the original, the names of all the different offices were clearly designated by inscriptions written above them. WALCOTT, *Conventual Arrangement of Canterbury*, INST. OF BRITISH ARCHITECTS, *Sessional Papers*, 1862-3. And II, that of S. Gall in Switzerland (see ABBEY, BENEDICTINE, and DRAWING). The remains at Ewenny and at Fountains are nearly perfect. Perhaps the most complete abbey for domestic arrangements is the chief seat of the Celestines, S. Pietro Celestino, near Solmona, so called in honour of Pietro da Morrone, Celestin II, pope 1294 (for five months). The suppressed monastery of Olivetines at S. Michele in Bosco, outside Bologna, is perhaps the finest of the monastic establishments in Italy—the dormitory was 427 feet in length. The arrangement of a monastic establishment is explained in the following works: ECCLESIOLOGIST *Journal*, ii, 33, 134, 161; and *Reports and Papers of Associated Architectural Societies*, 1851, i, 293, by W. H. DEYKES; and of Convents, by M. H. BLOXAM, i, 177. WALCOTT, *Church and Conventual Arrangement*, 8vo., Lond., 1861. DALY, *Révue Générale*, ix, 305, etc.; x, 14, etc.; xiv, 11, etc. VIOLETTE LE DUC, *Dict.*, i, 218, 266-314. SHARPE, *Architecture of the Cistercians*, 4to., Lond., 1874.

THE ABBEY had dependent churches, cells, etc. For example, the abbey at Whitby in Yorkshire had cells at Hackness and Middlesburg; All Saints' Fishergate in York; and Gotsland. *Hermitages*, Mulgrave, Westcote, Hode, Saltburne and Eskdale. The dependent churches and chapels were Ayton magna, Burneston, Carleton in Cleveland, Crosseby, Ravensworth, Eskdale, Fielingdale, Hackness, Harlesley or Harkesey east, Harkesgarth, Hoton in Pickering Hythe,

Huntington near York, Ingleby-Grenehon, Kirksby in Cleveland, Newton under Orneback, Rowal, Semar, Skirpenbeck, Slingsby, Snetun, Sutton on Derwent, Uglebardely, and S. Mary's Fishergate, York.

At the time of the Conquest, 1066, there were about one hundred monasteries in England. Within one hundred and fifty years after, or before the 1st of Henry III, there were founded and refounded in England four hundred and seventy-six abbeys and priories, besides eighty alien priories: of these, fourteen abbeys, forty-four priories, seven alien priories, and thirteen cells, three preceptories and three commandries, were in Yorkshire. After that time there were many chantries, twenty-eight houses of friars, many hospitals and colleges founded, but no houses of monks, nuns, or canons. BURTON, *Mon. Ebor.*, fol., York 1758, p. 57. Three hundred were built in England temp. Henry I, Stephen, and Henry II; LYTLETON, *Henry II*, 4to., Lond., 1767, ii, 329-31. A list of monasteries formerly in England is given in WEALE, *Dict. of Terms*, 12mo., Lond., 1850; and in GODWIN, *English Archaeologist Handbook*, 8vo., Lond., 1867. The *Dissolution* or suppression of monasteries in England is explained in BAKER, *Gloucestershire*; and *Three letters* relating thereto, edited by T. WRIGHT, 1843.

The sixth general council (the Quinisext in Trullo, canon 47, in BEVERIDGE, i, 213) restrains women from passing the night in a male, or men in a female monastery. The seventh general council (the second Nicene, canon 20, in BEVERIDGE, i, 325), prohibits the erection of double or promiscuous monasteries of both sexes; but it appears from BALSAMON that the prohibition was not effectual. It was the custom in Scotland and in Northumberland in ancient times for monks and nuns to live together in the same monastery, who were all subject to the government of the abbess. Chicksands priory, Bedfordshire, one of the largest houses of the Gilbertine order, founded 1150, was capable of accommodating no fewer than fifty-five monks and more than double that number of nuns, an arrangement not unusual with that order; BRIDGES, in *Reports and Papers of Associated Societies*, 8vo., Lincoln, 1866, pp. 329-53. In some such rare cases as those of the Bridgetine buildings, two conventual establishments, a monastery and a nunnery, were separated only by a church common to both; and the whole group of buildings has been generally, though not very properly, called a double monastery. LINGARD, *Anglo-Saxon Church*, edit. 1845, i, 213-5, mentions there were several in England before the Danes; as Wimborne, Whitby, Berking, Coldingham, Ely, Wenlock, and Repandun; in France, Faremoutier, Chelles, and Andeli. At Beverley, monks, canons, and nuns, were all under one abbot. A double monastery, dedicated to S. Salvador, of Benedictine monks and nuns existed from 1011, at Oña in Spain, till 1032, when it was reformed; a fine example of Gothic work, 1470, the cloisters, 1503 (FORD, *Handbook*, 1855, p. 864). There was another (Benedictine) at S. Vicente near Oviedo from 764 (MADOZ), 1280 (FORD).

In addition to the publications named s.v. ABBEY are to be noticed: DUGDALE, ELLIS, etc., *Monasticon Anglicanum*, 8vo., fol., Lond., 1817-30. TOPHAM, *Hist. of the ancient Abbeys, Monasteries, etc.*, fol. 1722-3. FULLER, *Church History*, 8vo., Oxford, 1845, vi, 286, iii, 307. STEVENS, *Monasticon Hibernicum*, 8vo., Lond., 1722. ARCHDALL, *Monasticon Hibernicum*, 4to., Lond., 1796. LENOIR, *Architecture Monastique*, 4to., Paris, 1852-6. CURZON, *Monasteries of the Levant*, 8vo., Lond., 1851, 4th edit. BEAUNIER, *Recueil historique, etc., des archevêques, évêchés, abbayes, et prieurés en France*, 4to., Paris, 1726; 1743, 3rd edit. REYHER, *Thuringia Sacra*, fol., Gotha, 1692, and fol. Frank. 1737.

MONASTIC ORDERS. These consisted of Benedictine, or black monks, and Cistercian or white monks. The *Regular Orders* were, Augustine or black canons and Premonstratensian or white canons. The *Military Orders* were Knights Templars, and Hospitalers. The *Conventual Orders* were Do-

minican friars, black friars or friar preachers; Franciscan friars, grey friars, or friars minor; nuns minoresses of the order of S. Clare; Carmelites, or white friars; Austin friars, or friars eremitic; Crossed or crouched friars. The colleges consisted of secular canons and priests. FIALETTI, *Briefve Histoire de l'Institution des Ordres Religieux, avec les figures de leurs Habits*, 72 portraits, 4to., Paris, 1658. *Ordres Monastiques, histoire extraite de tous les auteurs qui ont conservé à la postérité ce qu'il y a de plus curieux dans chaque ordre*, 5 vols. 12mo. HELYOT, *Histoire des Ordres monastiques, religieux, et militaires; et des congrégations séculières de l'un et de l'autre sexe, qui ont été établies jusqu'à présent*, 8 vols, 806 pl., 4to., Paris, 1714-19. Other editions, 8 vols., 1721; and 1792. *Avec notice, etc.*, par V. Philippon de la Madelaine, 8 vols., 4to., Guingamp, 1838. German translation, 8 vols., 4to., Leipzig, 1753-56. HELYOT, *Histoire abrégée et Costumes coloriés de tous les monastiques, religieux et militaires, des congrégations séculières de l'un et de l'autre sexe*, 2 vols., pl., 4to., Paris (1830). FONTANA, *Storia degli Ordini Monasteri relig. et milit.*: trad. del Francese, 4to., 1737. JAMESON (Mrs.), *Legends of the Monastic Orders as represented in the Fine Arts*, 3rd edit., 8vo., Lond., 1863. S. P. DAY, *Monastic Institutions; their origin, progress, etc.*, 12mo., Dublin, 1844.

MONCE (SIGISMOND FERDINAND DE LA), was born 29th June 1678 at Munich, and studied in Italy. In 1711 he drew the section of the interior, and plan, of the church of the Invalides with its pavement, engraved in the *Cabinet du Roi*; and drew many views for BRICE, *Nouvelle Descr. de Paris*, 12mo., Paris, 1725. He settled 1731 at Lyon in France, where he designed the façade and portail to the collegiate church of S. Just, a view of which is given in LABORDE, *Monumens*, fol., Paris, 1816, ii, pl. 18-9; the entrance gateway to the hôtel Dieu; while his design for the hospital, the dome, vestibule, and the façade fronting the green, were carried out before 1784 by J. G. Soufflot, and were destroyed 1793; the plan for the quai de Rhône; 1738, four designs for a bridge near the river opposite the hospital; the marble pulpit in the collegiate church of the Trinity; the plan and different portions of the church of the Chartreux (not Cistercians as in Milizia) with its fine dome; 1739, plan, elevation, and model of a chapel of Notre Dame in the church of S. Nizier; and other works, of which MILIZIA notices a small gate over the Rodano in the manner of that of Ripetta at Rome. He left in MS. criticisms upon eight modern churches built at Lyon 1747-9, in which city he died 30th Sept. 1753. BREGNOT DU LUT, *Biog. Lyonnaise*, 8vo., Lyon, 1839. 3.

JEAN DE LA MONCE, of Paris, painter and architect to the king of Bavaria, died about 1700. He designed the pulpit in the great college of Jesuits at Lyon, formed of precious stones with bas-reliefs of gilt bronze, which was first used on Easter-day 1700. DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1856.

MONCKTON FARLEIGH QUARRIES, see FARLEIGH DOWN STONE.

MONDELLA (G.), see MENDELLA (G.)

MONDONEDO. A city in Galicia in Spain. The cathedral, dedicated to S. Iago, 1219-21, had three naves; four chapels were added 1595-9, in rear of the *capilla mayor*; it is a solid structure of the Corinthian order, and contains a statue of the Virgin brought from S. Paul's cathedral, London, at the Reformation. There are also an episcopal palace, a town house, a nunnery, and suppressed monasteries, one of which is used as a theatre. 50. 66.

MONEAH. A town of Bahar, in the presidency of Bengal, in Hindoostan, situated at the junction of the rivers Sone and Ganges, is remarkable for the mausoleum of Mudoom Shah Dowlat, of freestone, an elegant specimen of Mogul architecture. DANIEL, *Oriental Scenery*, fol., Lond., 1795, ser. 1. pl. 12.

MONEGRO (ALVARO), of Toledo, where he was in high repute, was father of the celebrated J. B. Monegro. He was

charged 1531 by A. de Covarrubias with the construction of the chapel of the Epiphany in the cathedral at Toledo from his designs. He also executed 1531-34 the *capilla de los reyes nuevos* in the cathedral under the same architect. 66.

MONEGRO (JUAN BAUTISTA), born at Toledo, studied at Rome, and became chief sculptor and architect to the cathedral of his native city. Together with his half brother, Luis de Carvajal, he was a pupil of A. Berruguete, and hence one of the school of the plateresque style. By order of Philip II, he executed seven colossal statues at the Escorial, which were fixed in August 1584, when he returned to Toledo, where on the death of D. de Alcantara in 1587 he was appointed by a royal decree maestro mayor at the alcazar at Toledo (P. de LIZARGARETE) at an annual salary at the rate of one hundred ducats, and seven reals per diem including Sundays and holidays; for which place he executed several statues, amongst them was one of archbishop S. Julian, placed upon the bridge of S. Martin. Being then recalled to the Escorial, he executed four statues of the evangelists.

Returning to Toledo, he undertook the reconstruction of the chapel of Nuestra Señora del S. Sagrario in the cathedral, the design of which is attributed to A. de Encinas, his pupil, and also to N. de Vergara the younger, and was continued by Monegro, but the works proceeded so slowly that although the first stone was laid 25th June 1595, they were not completed until 1616. In Ventillosa del Tajo he constructed the chapel of the archiepiscopal palace; at Jaen, the chapel of the nuns of Sta. Clara, 1606-21; and the chapel of the Holy Conception at La Guardia. He was also considered to have designed the nunnery of the Bernardines at Alcala de Henares, and 1617 the façade of the archbishop's palace there, sometimes attributed to J. Gomez de Morez, and perhaps carried out by S. de la Plaza. In 1609 he directed the building of the church of S. Juan de los Reyes. Monegro died 16th February 1621, at Toledo, and was buried in the sacristy of the parish church of S. Lorenzo.

He is sometimes confounded with Juan Bautista di Toledo. 3. 66.

MONELLE, monial, moynialle, moynell, monyall. Various ways of writing MULLION in the middle ages.

MONEYPENNY (GEORGE), designed the gaols at Winchester, and at Leicester; 1807-10 the bridewell or house of correction at Exeter, removed 1848-50; and the county gaol at Oxford erected on the site of the castle.

MONIAL and MONYALL, see MONELLE.

MONICA (GIOVANNI MARIA DELLA), rebuilt or repaired the church of S. Patrizia for the Benedictine monks at Naples. 95.

MONICA (VINCENTO DELLA), renewed or rebuilt 1572 the monastery and church of S. Gregorio Armeno, also called S. Liguoro, considered one of the handsomest in Naples: it was continued 1574 by G. B. Cavagni. 36. 95.

MONICON. A pigment, see DAMONICON.

MONK. For the orders of monks see MONASTERY. In France, the monks at an early period worked as masons and artificers of all kinds, in the erection of their monasteries, the most intelligent amongst them being employed to conduct and superintend such operations, without making use of the assistance of seculars. The superiors often furnished the designs, and acted as directors and surveyors of the works. The canons of king Edgar (959-975) declare, "we command that every priest, to increase knowledge, diligently learn some handicraft;" WILKINS, *Leges Anglo-Saxon.*, fol., Lond., 1721, p. 83. In rebuilding the part of Canterbury cathedral after the fire of 1174, the 'master', William of Sens, being injured by a fall, committed the care of the work to William the Englishman, a young monk of that foundation. In rebuilding 1214-62 the church of Notre Dame de Dunes in Flanders, none but the ecclesiastics and members of the monastery were employed. They amounted to more than 400 persons, some applying themselves to making the designs, some the paintings, the sculpture, mason's, carpenter's, joiner's and locksmith's work, and to other arts dependent

on architecture; FELIBIEN, *Arch.*, iv, p. 214: WHITTINGTON, *Account of Building the church of N. D. de Dunes*, p. 37; and his *Historical Survey*, 8vo., Lond., 1811, p. 72, who says that "the whole of this edifice was erected by the monks themselves, assisted by the lay brothers and servants, amounting in all to more than eighty persons; and it deserves to be mentioned as a curious instance of the arts being generally studied and practised in a monastery at so late a period". The nave of Gloucester cathedral was roofed in "A.D. 1242, completa est nova volta in navi ecclesie, non auxilio fabrorum ut primo, sed animosâ virtute monachorum tunc in ipso loco existentium". May we conclude from this passage, says DALLAWAY, p. 188, that the monks finished the work with their own hands? In the church of S. Galgano near Siena, finished 1268, more than eighty monks worked; DELLA VALLÈ, *Lettere Senesi*, 4to., Venice, 1782-86, ii, 18. In the compass of one hundred years there were six priors of Christ church, Canterbury, who made architecture their study; GOSTLING, *Walk in Canterbury*, 8vo., Canterbury, 1779, p. 252. Even in the present day, it is said that at the Roman Catholic church of S. Augustin, at Galway, consecrated Nov. 1859, "M. B. Moran, archit., the clergy of the community were the builders"; *BUILDER Journal*, xvii, 750. VIOLETT LE DUC, *Dict.*, Art. Architecte, gives a good account of lay architects from the thirteenth century.

In Belgium, as in the rest of Europe, the known architects previously to the 14th or even the 15th century, are very small in number; "this arises from the fact, as those are justly of opinion who have made the middle ages their study," says M. de Caumont, "that during this eminently Catholic period, an individual, so to speak, existed not, his identity was lost in the fraternity or monastery where he gave up in common not only his life, his substance, and his prospects, but his very thoughts, his genius, and his soul." SCHAYES, *Treatise on the Pointed Style*, etc., 4to., (Weale) Lond., 1844; DE CAUMONT, *Cours d'Antiquités Mon.*, part 4, p. 279.

The arts flourished so much in convents to the last, that one Gyffard, a visitor employed by Thomas Cromwell to make a report of the state of those societies previous to their suppression, pleads in behalf of the house of Wolstrop (query Woolsthorp or Wyrthorpe priory, Northamptonshire), "That there was not one religious person there, but that he could and did use, either embrothering, writing books with very fair hand, making their own garments, carving, painting, or grafting." STRYPE, *Eccles. Memorials*, fol., Lond., 1733, i, 255; quoted in WALPOLE, *Anecdotes*, chap. v. COPY, IMITATION.

MONKDEN, or SHING-KING. The capital of Tung-teên-foo, situated to the east of Pekin, in China. It has been designed for a great city, but although some of the buildings in the inner city are erected in the best style of Chinese architecture, those in the outer one are mere huts. Near the gates are the tombs of the two first Mantchoo princes, who took the title of emperors, and are enclosed with battlemented walls and guarded by mandarins of high rank. 72.

MONKEY. The apparatus used in pile driving, which disengages the ram or weight falling, and again secures the ram after each fall. The weight of the ram is usually from 8 to 10 cwt., although they are sometimes equal to 15 cwt. The length of the fall is regulated at pleasure by a rope fastened to the monkey, which allows of its moving upwards to a certain extent, when its disengagement from the ram is effected. A pair of forceps or tongs have also been extensively used for detaching the ram. FISTUCA. The ram itself is often commonly called the monkey; IMPACT. A discussion on the question of the work done by a monkey, is given in *BUILDER Journal*, 1863, xxi, 430, 574, 607; and a rule in *BUILDING News Journal*, 1858, iv, 1029, being stated as, "The velocity at the end of the fall in feet per second = 8 times the square root of the height in feet; the time of fall in seconds, one fourth of the square root of height of fall = seconds; effect, the initial weight multiplied by velocity.

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Thus 16 ft. fall $8 \times 4 = 32$ velocity in feet per second.

$\frac{1}{4} = 1$ foot time in seconds.

$1 \times 32 = 32$ effect.

The works by De Morgan and R. Willis should be consulted on the question.

MONKEY HOUSE. The examples in the Zoological Gardens, London; at Bristol; in the Jardins des Plantes at Paris; and the Acclimatisation Society, should be studied. Good ventilation, warmth, and cleanliness are three essentials.

MONOCHROME (Gr. *μόνος*, single, and *χρῶμα*, colour). A painting executed in a single colour, usually red or white in ancient works. This description of art was known to the Etruscans; the tombs of the Tarquins near Corneto show several figures painted in white upon a dark ground. Four monochromatic pictures painted on marble in the Museo Borbonico are the sole examples of this very ancient style which have yet been discovered, except those mentioned by WINCKELMANN, as "paintings of a Tyrian purple colour, executed on tables of white marble and found in Herculaneum"; STARKÉ, *Travels in Europe*, 1839, p. 264. They may be the same as are represented in the first four plates of the first volume of the paintings at Herculaneum. The most numerous works existing of this kind of painting are on terra cotta, such as the Etruscan vases. 6.

The term is now applied also to paintings in tints of one colour in imitation of bas-reliefs.

MONOGRAM (Gr.). A cypher, initial letter, or other device composed of two or more letters arranged in such a manner as to form a single design. It is used often as the signature on their works, by painters, engravers, etc. In ecclesiastical decoration of the fourteenth and fifteenth centuries, the names of the Saviour and of the Virgin Mary were frequently embroidered as monograms, in which the contractions exhibit great ingenuity. The emperor Charlemagne employed one in place of his sign manual. In the church of Sta. Agata Maggiore at Ravenna, completed about 417, and in that of San Vitale, built 534, are to be seen many examples among the ornaments of the blocks over the capitals; WOODS, *Letters*, 4to., Lond., 1828, ii, 126, gives one of them, and states what names they were intended to commemorate is very uncertain.

It would seem that the employment of monograms, which appear in the catacombs, was continued (except by the Lombards in the seventh and eighth centuries) until the middle of the sixteenth century. It is said that S. Bernardino of Siena invented the abbreviation *IHS* about 1437, but OTTE, p. 238, appears to give earlier examples of the letters. WEBB, *Argument for the Greek origin of Monogram I.H.S.*, 8vo., Cambridge, 1841. DIDRON, *Iconog. Chrétienne*, 8vo., Paris, 1845.

The best works on artists' monograms are STELLWAY, *Monog. Lexicon*, 8vo., Frankfort, 1830; HELLER, *Monog. Lexicon*, Bamberg, 1831; BRULLIOT, *Dict. des Monog.*, etc., 3 vols., 4to., Munich, 1832. LETTER. MASON'S MARK. REBUS.

MONOLITH (Gr. *μόνος* and *λίθος*, one stone). A large pillar, column, slab, or block, in one piece of granite, marble, or stone; see MAENHIR; OBELISK; ROCK-CUT TEMPLE; STONE, as set in buildings, as at Baalbec, and in Cyclopæan and Pelasgic constructions.

The MAUSOLEUM at Ravenna of Theodoric, king of the Goths, consists of a single chamber 30 ft. diam. inside and 36 ft. outside, having a domical covering of one piece of Istrian stone, which is about 8 ft. 3 ins. thick, and hollowed out for a depth of about 6 ft., leaving about 3 ft. at the top, and about 2 ft. 3 in. at the sides or its ring; but these dimensions are not given in the illustrations of the building in ISABELLE, *Les Edifices circulaires*, fol., Paris, 1843, and the section and elevation do not agree. The usual authorities state that the stone is "hollowed to a depth of 10 ft." The celebrated single block in the duomo at Ravenna was the largest example of the use of granite in modern times, until the erection about 1760 of the statue of

Peter the Great at S. Petersburg on a rock of the red granite of Ingria; CARBURI DE CEFFALONIE, *Monument*, fol., Paris, 1777. The grand-duke Cosmo I caused a granite block to be cut into a basin measuring nearly 66 ft. in circumference, which was placed in the gardens of the Pitti palace at Rome. The sarcophagus for the tomb of the duke of Wellington in S. Paul's cathedral is of schorl porphyry from Luxulian near S. Blazey in Cornwall. It is 10 ft. 3 in. long, 5 ft. 1½ in. wide, and about 6 ft. 6 in. high, but was cut into two stones, the lower one weighing about eight tons, the upper one six tons. Among other modern monoliths are:—the basin for the fountain, 1862, at the eastern entrance of the Champs Elysées at Paris, is 11 ft. 2 in. diam.; the block weighed 24 tons, 12 cwt.: and a piece of sculpture representing the Crucifixion, to be set up in the autumn of 1875 in the village of Oberammergau. The sculpture has been executed by Halbig, of Munich, as a commission from his majesty the king of Bavaria. A difficulty has arisen as to its transport from Munich to Oberammergau, for as its mass weighs 25,000 kilogrammes (about 24 tons 12 cwt.) ordinary means are insufficient for its safe conveyance.

MONOLITHIC COLUMNS.

| | |
|----------------------------|--|
| ALEXANDRIA | Pompey's pillar, granito rosso, 67 ft. 3 in. high. |
| ROME | Pantheon, 48 ft. 10 in. high. |
| " | Ruins near Monte Citorio, 52 ft. 4 in. high. |
| " | Baths of Diocletian, 38 ft. 4 in. high. |
| " | Baths of Caracalla, 38 ft. 4 in. high. |
| " | (Now at Florence, near the ponte Trinità.) |
| " | Church of S. Paolo (2), 38 ft. 4 in. high. |
| CONSTANCE | Cathedral, sixteen columns, <i>cir.</i> 1052. |
| MILAN | Inside the door of the cathedral, two of migliarolo (red granite), from Baveno, about 32 ft. high. |
| " | Arco della Pace, Crevola marble, 41'478 ft. high. |
| " | 4'147 ft. diameter. |
| " | White marble from a quarry on south side of Simplon road, for Napoleon I, about 40 ft. high. |
| S. PETERSBURG | S. Isaac's cathedral, portico (48), 45 ft. 6 in. high. |
| " | 6 ft. 6 in. diameter. |
| " | Ditto, in peristyle of dome (24), 42 ft. high. |
| " | Weight 66 tons, placed at a height of 150 feet. |
| " | Ditto, towers (32), all of granite, 30 ft. high. |
| " | One raised by Ricard de Montferand, 96 ft. high, about. |
| " | Our Lady of Kazan (50 inside), 40 or 42 ft. high. |
| " | Finland granite, 4 ft. diameter. |
| BERLIN | Hall of Victory, 1870 (16), Swedish granite, block 16 ft. high, about 4 ft. diam., weighing 300 centners. |
| KEHLHEIM | Hall of Liberation 1847 (18), granite, 27 ft. with marble caps and bases, 4 ft. 4 in. diam. |
| STRATHFIELDSAYE | Wellington memorial, 1862, Penryn granite, 31 ft. high. |
| " | Nearly 35 tons. |
| LONDON | King's library, British Museum, 1830 (4), red Aberdeen granite. |
| " | Carlton Club, Pall Mall, red Peterhead granite. |
| " | S. Paul's, north transept, (4) veined marble, 9 ft. 8 ins. high, 14 in. diameter. |
| " | " south transept (4) Breccia, 16 ft. 9 in. high. |
| " | Nearly 1 ft. 11 in. diam. |
| " | National Provincial Bank of England (40), Ipplpen quarry, Devonshire, 12 ft. 3 in. high, 18 in. diam. on the fillet. |
| LIVERPOOL | St. George's Hall. |
| LYONS, KILDARE | Portico at lord Cloncurry's (4), red Oriental granite, 12 ft. high, 2 ft. 0½ in. diam. |
| MENAI STRAITS | Britannia bridge, see MONA MARBLE. |
| WOBURN ABBEY, BEDFORDSHIRE | Eight columns in the sculpture gallery, two being of Breccia Africana, two of a variegated sort of alabaster, two of Cipollino marble, and two of Bigio, discovered at Rome by the late Mr. Brand, of the Hoe, Herts; they were set up <i>cir.</i> 1830, white marble caps also antique, of a rich composite order, also discovered in the same excavation. DUKER OF BEDFORD and H. CORNBOLD, <i>Woburn Abbey Marbles</i> , fol., Lond., 1822. |

DONALDSON, *On Obelisks and Monoliths*, in *BUILDER Journal*, 1862, xx, 369.

For the mode of raising stones, see CRAMPOONS; LEWIS; and LIFTER.

A horseshoe-shaped cavity in the sides of the block; and knobs

left in working the stones, of which many are still to be seen in unfinished temples, were means whereby large stones were raised, but no sufficient information has come down to us from the ancient peoples as to their way of raising great weights. The following remarks are added here, as they apply to the points of raising or moving, as well as to the subject of the article.

In Egypt, when moving the great blocks, "it is singular that the position of the ring to which all the ropes were attached for moving the mass, was confined to one place at the front of the statue, and did not extend to the back part of the sledge, but this was owing to the shortness of the body; and when of great length it is probable that ropes were fixed at intervals along the sides in order to give an opportunity of applying a greater moving power. For this purpose, in blocks of very great length (as the columns at Fateerh, which are about 60 ft. long and 8½ ft. diam.), certain pieces of stone were left projecting from the sides, like the trunnions of a gun, to which several ropes were attached, each pulled by its own set of men. Small blocks of stone were sent from the quarries by water to their different places of destination, either in boats or rafts; but those of very large dimensions were dragged by men overland. The obelisks transported from the quarries of Syene, at the first cataracts, to Thebes and Heliopolis, vary in size from 70 to 93 feet in length. They are of one stone; and the largest in Egypt, which is that of the great temple of Karnak, is calculated to weigh about 297 tons. This was brought 138 miles from the quarry to where it now stands, and those taken to Heliopolis passed over a space of more than 800 miles. The power, however, to move the mass was the same, whatever might be the distance, and the mechanical skill which transported it five or even one, would suffice for any number of miles. In the ruins of western Thebes in the plains of Goorneh are two colossi of Amunoph III of a single block each (one the Vocal Memnon) 47 ft. high, which contain about 11,500 cubic feet, and are made of a stone not known within several days' journey of the place; and at the Memnonium is another of Remeses II which, when entire, weighed upwards of 887 tons, and was brought from E'Soan to Thebes, a distance of 138 miles. HERODOTUS mentions a monument of a single block of stone, which Amasi transported from the city of Elephantine to Sais. Two thousand men were occupied three years. Its length was 22 cubits (31½ ft.), breadth 14 (23 ft.), and height 8 (12 ft.), and within 18 cub. 20 digits (28 ft. 3 in.) length, 12 (18 ft.) width, and 5 (7 ft. 6 in.) height. It lies near the entrance to the temple, and was doubtless like that of the same king at Tel el Mai, given by BURTON, *Excerpta Hierog.*, the dimensions of which are 21 ft. 9 in. high, 13 ft. broad, and 11 ft. 7 in. deep; and internally 19 ft. 3 in., 8 ft., and 8 ft. 3 in.

"The skill of the Egyptians was not confined to the mere moving of immense weights; their wonderful knowledge of mechanism is shown in the erection of obelisks and in the position of large stones raised to a considerable height and adjusted with the utmost precision, sometimes too in situations where the space will not admit the introduction of the inclined plane. Some of the most remarkable are the lintels and roofing stones of the large temples; and the lofty doorway leading into the grand hall of assembly at Karnak is covered with sandstone blocks 40 ft. 10 in. long and 5 ft. 2 in. square. In the quarries at E'Soan (Syene) is a granite obelisk, which, having been broken in the centre after it was finished, was left in the exact spot where it had been separated from the rock. The depth of the quarry is so small and the entrance to it so narrow that it was impossible for them to turn the stone in order to remove it by that opening; it is therefore evident that they must have lifted it out of the hollow in which it had been cut, as was the case with all the other shafts previously hewn in the same quarry." The above account is quoted from WILKINSON, *Ancient Egyptians*, 8vo., Lond., 1837-46, iii, 327.

HERODOTUS, ii, 155, mentions, besides the above named chamber, a half kind of monolith he saw within the *temenos* of Buto in the Delta, the shrine of the goddess Latona; "it

was of one solid stone having equal sides, the length of each was forty cubits; the roof is of another solid stone, no less than four cubits in substance", called in Cary's translation 'a cornice of four cubits deep'. SAVARY notices that "this enormous rock, 240 ft. in circumference, was brought from a quarry in the isle of Philæ, on rafts, for the space of 200 leagues, and without contradiction was the heaviest weight ever moved by human power. Many thousand workmen were three years employed in taking it to its place of destination." This monolith has been described as having "each side of equal dimensions, 60 ft. in length and 60 ft. in height; the roof formed of another single stone, which covered the whole and projected 6 ft. beyond the edge of the vertical walls; this stone, 72 ft. square, would equal a space nearly half the area of S. Martin's church. It is thought that HERODOTUS has not exaggerated the dimensions when the two colossi at Thebes are remembered", but this description seems to go beyond his words. DENON, pls. 41 and 125, found two monoliths of small dimensions in the island of Philæ, both of them in the great temple, and placed respectively at the extremity of two adjoining sanctuaries. One was 6 ft. 9 in. in height, 2 ft. 8 in. wide, and 2 ft. 5 in. deep, of granite. Mr. Hamilton found at Gau Kebir, a monolith chamber of the same character; it had a pyramidal top, and measured 12 ft. in height and 9 ft. in width at the base, p. 267. The large dark green granite sarcophagi in the Serapeum at MEMPHIS, are noticed in that article: and in the ruins at Memphis was a green granite chamber of a single stone which was broken about 1349. At El Modn, on the east bank of the Nile, is an insulated rock excavated into the form of an Egyptian temple with outer and inner doors, perhaps the only instance of such a work; *Egyptian Antiquities*, 8vo., Lond., 1832, p. 190, *et seq.*

Of the Assyrian antiquities, perhaps the largest block brought over to England is one of the winged human-headed bull, 10 ft. square and 2 ft. thick, of gypsum; the winged human-headed lion is 9 ft. square.

In Hindostan;—the statue of the elephant on the island of Elephanta near Bombay is cut out of a detached mass of blackish rock; it was 13 ft. 2 in. long, and about 7 ft. 4 in. high. The temple at Ellora, generally known as the Kylas, ninth or tenth century, the rock being cut away externally as well as internally, and left in a pit about 100 ft. deep, the floor being about 150 ft. wide and 270 ft. long. At Mahavellipore the seven cognate temples have been formed out of boulders of granite lying free on the shore, twelfth to thirteenth century. The octangular granite shaft, called Gurda Kambha, often 40 ft. high, in front of a pagoda in Hindostan.

At Tanjore, in the principal temple in the fort, a magnificent figure of a bull is hewn out of a solid mass of black granite—a stone not to be found within a circuit of many miles—suggesting the question by what means, now unknown to us, the men of old transported masses which we of modern times could scarcely attempt to carry away with all our means and appliances. Another large mass of granite surmounts a lofty tower 170 ft. high, of the kind characteristic of all Hindoo temples, and an inscription states that in order to place it where it now rests, an inclined plane was constructed five miles in length; *ALL THE YEAR ROUND*, Nov. 19, 1864, p. 347.

In Ceylon, there are in the brazen palace at Anarjapoor 1800 stone steps, many exceeding 10 ft. in length. A single piece of granite hollowed into an 'elephant trough' with ornamental pilasters, which measures 10 ft. long, 6 ft. wide, and 2 ft. deep. Amongst the ruins of Pollanarua is a slab 25 ft. long, 6 ft. wide, and 3 ft. thick, dated in the twelfth century, recording its transport for a distance of more than thirty miles. In front of the Sat Mahal Prasada, the seven storied house, is a carved slab 26 ft. long, 4 ft. wide, and 2 ft. thick, with an inscription stating it was brought from the mountain at Anarjapoor, a distance of more than eighty miles; it is said to have been engraved about 1196; TENNENT, *Ceylon*, 3rd edit., 8vo.,

Lond., 1859. The great staircase at Persepolis is formed of blocks of stone, comprising two, three, and four steps in each, being about 24 ft. wide, 4 in. rise with 14 in. treads, but the descriptions of it given in GWILT's *Encyc.* from DE BRUYN and others; in RAMÉE, *Hist.*; and in TEXIER, *Arménie*, differ greatly.

At Cordoba in Spain, the *mihrab* in the mosque has a monolithic roof 15 ft. in diam.

MONOPODIUM. A wooden table with one leg, in use among the Romans at repasts. CAYLUS in his work gives several examples of such furniture in stone or metal; and one is extant among the bronzes at Herculaneum. A monopodium was found in the dining room of the house of queen Caroline at Pompeii.

MONOPTERAL. A species of temple (*Ædes*) of a round form, having neither walls nor cella, but only a cupola sustained by columns which are placed on a basement; steps lead up to the floor on which is the tribune, with the altar and statue of the divinity. VIREUVIUS, b. iv, chap. 7.

MONOTA. A vase with one handle. 23.

MONOTRIGLYPH. The interval observed between columns of the Doric order, to receive one triglyph only and its two metopes.

MONREALE. A town situated four miles from Palermo in Sicily. It was founded by the Norman prince, William II (the good), who also founded 1167-1174 the church and the Benedictine monastery, which possesses a good library: the cloister is the only ancient part remaining, and is about 169 ft. square, and 137 ft. in the open portion. The church, made cathedral in 1182, is dedicated to Sta. Maria Nuova, and is the last and most splendid temple erected by the Normans in Sicily. Its external dimensions are 313 ft. by 124 ft. (*HANDBOOK*); KNIGHT says 266 ft. and 85 ft. 4 in. internally: the plan is a Latin cross with three aisles, and nearly resembles the cathedral of Cefalù, having three apses, no central tower or cupola, and two west towers originally of five stories and 190 ft. in height, connected by a portico; the east end remains in its original state. The north portico was added 1569; the west portico 1770. The roof was burnt 1811, but has been restored in imitation of the ancient one. The bronze west door by Bonanus of Pisa, 1186, is described *s.v.* Door, p. 55. The north doors are by Barisano of Trani, who executed those at Trani and Ravello 1179. "All the architectural features in the building were subordinate in the eyes of the builders to the mosaic decorations which cover every part of the interior;" FERGUSSON. FASO PIETROSANTA, duca di Serradifalco, *Duomo di Monreale e di altre Chiese Sicili Normanne*, fol., Palermo, 1838. WARING and MACQUOID, *Arch. Art*, fol., Lond., 1850, pl. 3. GALLY KNIGHT, *Normans in Sicily*, 8vo., Lond., 1838, p. 284, 338. GRAVINA, *Il duomo di Monreale*, 90 pl., fol., Palermo, 1860. FORBES *Description of Conventual Church*, 1842. DALY, *Revue Générale*, 1857, xv, pl. 19 and 34, gives mosaics and the cloister. D'AGINCOURT, *Hist. de l'Art*, Architecture, pl. 35: HITTORFF and ZANTH, *Arch. moderne de la Sicile*, fol., pl. 66-7, 76: MOYEN AGE PITTORESQUE, pl. 135: BIANCHI and CUCCINIELLO, *Viaggio*, fol., Naples: WYATT, *Mosaics*, fol., Lond., 1848, who states, p. 17, that the duomo and great cloister exhibit good specimens of volcanic mosaic, so well adapted for external decoration. LELLO, *Descrizione del real tempio e monasterio di M.*, with additions by GUIDICE, fol., Palermo, 1702. TARALLO, *I reali sepolcri del duomo di M.*, Palermo, 1826.

The piazza in front of the cathedral was enclosed by an arcade from which the columns in the north portico were taken. There is also a Capuchin convent and some three other churches. A royal summer residence called Renna is situated outside the town.

The road from Monreale to the porta nuova at Palermo was formerly a grand and wide avenue; it is lined with palazzi and villas of little merit as works of architecture, but very pictu-

resque; among them occur at short intervals fountains, such as that shown in *Illustrations*, pl. 79, to which it belongs as a species of garden decoration. Although several of these existed before 1760, yet the number added by Monsignore Testa, archbishop of Monreale, may give him the credit of thus usefully embellishing this beautiful road. HOUEL, *Voy. Pitt.*, fol., Paris, 1782, pl. 37. Archbishop TESTA, *Vita del Guglielmo II*, fol., Mon., 1769. FERGUSON, *Handbook of Arch.* 28.

MONRO (...), altered Rusborough, co. Wicklow, for the earl of Milltown, which house was designed by R. Cassels; NEALE, *Seats*, etc., 4to., Lond., 1826, ser. 2, iii.

MONSIAUX (PIERRE DE), was master of the works to the city of Paris in the thirteenth century. At one of the doors of the abbey of S. Antoine des champs, near Paris, was an inscription recording that in 1257, while about to pull down the *portail*, he was enveloped in flames and perished. DU BREUL, as given in LANCE, *Dict. des Arch. Franç.*, 8vo., Paris, 1872.

MONSIGNORE (FRA GIOCONDO), a mistake of some biographers for GIOCONDO (FRA GIOVANNI).

MONSTER (Fr. *figure fantastique*). See CHIMERA, GARGOYLE, GRIFFIN, SPHINX. In the churches of the mediæval period there are many figures of this sort carved either on the capitals, cornices, or string courses, or on doors, stall work, etc. As examples containing this sculpture, may be cited the churches of Montmorillon, Montivilliers, S. Georges de Boscherville, S. Trophime at Arles, Nôtre Dame and S. Germain des Prés at Paris, Moissac, etc. On the exterior of the cathedral of Nôtre Dame at Paris, are the upper portion of, and entire, animals looking over the balustrade of the great galleries and of the summit of the towers; and at the summit of the two west towers of the cathedral at Laon, the sculptors of the thirteenth century have placed in the open work of the angle pinnacles animals of a large size. The balustrades at the cathedral of Reims are surmounted by curious figures of birds draped and hooded. 7.

The multitude of animal forms, which have been used in the decoration of architecture, render it impossible to enter in this place upon their names or forms; and indeed, except the emblems of the four evangelists, so often seen at the angles of church towers, there are perhaps none, with the remarkable exceptions to be immediately noticed, which can be said to enter into the structural composition of a building. These exceptions are the figures, frequently colossal, of leonine monsters, which it has been observed may be considered as much the characteristics of a Lombard basilica as the sphinxes of an Egyptian temple, or the winged bulls of the palaces of Nineveh; they support the pillars of the portals, are carved out of blocks of marble, and although finished with much delicacy, exhibit considerable grandeur of style. The allegorical meaning of these animals does not appear to have been preserved; if supposed to represent the power of the Christian faith, some of the objects grouped with them are inexplicable. At Cremona one grasps an animal something like a fox holding a bird in its jaws, the other a serpent, perhaps intended for sin; at the church of S. Zeno in Verona they are excellent in design and execution: one grasps a horned human head, the other a horned snake; at the church of Sta. Giustina in Padua are four very fine examples, one grasping a serpent, and the other a warrior in chain-armour, of which last variety there is another instance in one of the two portals of the cathedral at Modena. At the cathedral of Verona the columns of the grand portal rest upon a variety of this monster, executed in very fine red marble, and with a severity of treatment approaching to that of early Greek sculpture—one grips a serpent, another two heads (Infidelity and Heresy?); and at Reggio the colossal marble lions, which belonged to a former basilica, are now placed in front of the church of S. Prospero, one grasps two skulls with the hind paws, others have the usual serpents and

rams; at Borgo S. Donino, one of the portals of the cathedral has kneeling rams, the others have lions. Further examples of this system will be found at the churches of S. Giovanni and S. Vincenzo at Lucca, and of Sta. Maria Maggiore at Bergamo; in the porch of the cathedral at Lodi are some fine griffins, as they are sometimes called; and at the cathedral at Piacenza the pillars rest upon strange combinations of crouching figures, together with the usual lions. Several of these instances will be found illustrated in KNIGHT, *Ecclesiastical Architecture of Italy*, fol., Lond., 1842-44.

HOPZ, *Historical Essay*, 8vo., Lond., 1840, observes that these monsters are also to be seen in the cathedrals at Ferrara, Parma, Mantua, etc., and in the pulpit of that at Siena, and the tombs in the church of S. Eustorgio at Milan: both in the front and apsis of the cathedral at Worms a whole colonnade rests on such bodies. On passing the Alps, however, if they appear at all, as in S. Pierre at Gelnhausen, and in the Rheinhof of Cologne, it is in a pigmy form, only half advancing from the mass, and like a dog barking from his hutch. On entering the cathedral at Como, the visitor will observe two lions or tigers supporting the bénitiers, and these are doubtless remains of the ancient basilica. Not to give too long a list of the sculptural application of the animal kingdom, it will be sufficient to note the MARZOCCO or lion, emblematic of Florence, on the torre del Marzocco at Leghorn; and the famous bronze griffin of Arabian workmanship, dismounted from the pinnacle of the cathedral, and now in the Campo Santo at Pisa.

W. HAWKINS, in a lecture, March 1864, alluded to the sketches of what are usually supposed to be mythical dragons, which have been found among the Indians, and at Pompeii; and pointed out the almost perfect resemblance they bear to animals which, it has since been proved, must have existed; and he observed that so close an imitation spoke of something more than a mere work of the imagination, and that it was not improbable such things actually existed at the time of the artists, who must have had some accurate knowledge of them. F. M. É. D'AYZAC, *Iconographie du Dragon*, 8vo., Arras, 1864.

The grotta delle Inscrizioni or grotta delle camere finte found at Tarquinii in 1827, had the opening closed by a large rectangular slab of stone divided into small square compartments containing figures of wild beasts or monsters, which MICALI, *Ant. Pop. Ital.*, iii, 105, pl. 67, vii, conceives to be emblems of the infernal spirits to whom the guardianship of the tomb was entrusted, set there to terrify those who would violate its sanctity; DENNIS, *Etruria*, 1848, i, 338.

SEROUX D'AGINCOURT, *Hist. de l'Art (Architecture)*, pl. 33, No. 5; and (*Sculpture*), pl. 26, No. 30-5. LAMACHE, *Dissertation*, in *LA FRANCE CATHOLIQUE*, i, p. 81; and in *UNIVERSITÉ CATHOLIQUE*, ii, 293 and 376. LANGLOIS, *Essai sur la Calligraphie au Moyen Age*, 8vo., Rouen, 1841, p. 70, etc.; citing BERGER DE XIVREY, *Traditions Téralogiques*, 8vo., Paris, 1836, in which he endeavours to find out the symbolism of the monsters created by the ancients and in the middle ages.

MONSTERET (JEAN), was one of the masters of the works to Philippe le bon, duc de Bourgogne. In 1450, as *maçon juré* to the city of Dijon, he made a report upon the levelling of the cours de Suzon dans la traversée de cette ville; CANAT, *Maitres d'œuvres*.

MONSTRANCE (Lat. *monstro*, to show). A transparent pyx or receptacle, in which in Roman Catholic processions the consecrated wafer is carried, and is also exposed upon the altars of their churches. Monstrances were often beautifully wrought. PUGIN, *Glossary of Ecclesiastical Ornament*, etc., 4to., Lond., 1846; 1868, 3rd edit., gives some examples, and considers that it is not probable they were introduced before the end of the fourteenth, or generally used till the fifteenth century. They were made in various forms; like a tower, image, cross, tube of crystal, radiated sun, etc. One in the church at Tiefeubronn, is given in *ALLGEMEINE BAUZEITUNG*, 1854, pl. 616. KING,

Orfèverie, fol., Bruges, 1853. A monstrance or pyx is an attribute of Sta. Clara.

MONT (DEODATUS DEL) or D. Delmont, a painter in high repute with Rubens, was for several years painter and architect in general to the duc de Nieuborg, and afterwards served the archduke Albert and the infanta Isabella until his death 1643, at Antwerp. His portrait is given in *True Effigies of Painters*, fol., 1694.

MONTAGNANA (IL), is said to have been a pupil of N. BARATTIKRO, who was employed 1170 or 1178. He is recorded as having renewed 1369 (or 1329) the campanile (built 888-1178) at Venice, the roof of which was so damaged by fire, 1400, as to require to be rebuilt, when it was done in stone in its former shape. SANSOVINO, *Venetia Descritta*, 4to., Ven., 1663, edit. Martinioni. SELVATICO, *Architettura*, 4to., Venice, 1847, pp. 76, 510. CICOGNARA says he built it 1400-50. 3. 5. 30. 62.

MONTAGU (RALPH), third baron Montagu of Boughton, created 1689 earl of Montagu, went in 1669 as ambassador to France, and there formed that taste in building and landscape gardening which he afterwards displayed in erecting his mansion at Boughton, as much after the manner of Versailles as the extent would admit. His town house was in Bloomsbury. He was 1705 created duke of Montagu, and died 8th March 1709. John, second duke of Montagu, who died 6th July 1749, rebuilt a great part of Boughton, given in NEALE, *Seats*, 4to., Lond., 1824, Ser. 2, vol. i, as the seat of the duchess of Buccleuch. Bloomsbury was designed by P. Puget or Pougnet, a Frenchman, after the fire of January 1685-6, which destroyed the house built by R. Hooke; it was bought for the British Museum in 1753.

MONTAIGU (NICOLAS) built 1744 the capuchin gate at Bordeaux. BORDES, *Hist. des Mon. de Bordéaux*.

MONTANA (JUAN DE LA), also a sculptor, resided in Salamanca. On the death of J. Gil de Hontañon, *maestro mayor* of the work at the cathedral of that city, J. de Alava, his successor, contracted Sept. 14th 1554 with Montaña, in conjunction with Juan Negrete, Diego de Vergara, and Miguel de Aguirre, for the construction of certain portions which related chiefly to the walls and cornices over the buttresses up to the transept; these works occupied three years and a half, being completed at the end of May 1558, and were approved by R. Gil de Hontañon, then *maestro mayor*. They were to be paid four thousand five hundred ducats, the necessary materials being supplied to them.

MONTANARI (MARCO), of Reggio, designed there the parish church of S. Bartolommeo, and the baths; and made a map of the state. He died December 1737. 73.

MONTANO (GIOVANNI BATTISTA), of Milan, was chiefly a sculptor. He designed many churches or chapels, tombs and altars in Rome, which were engraved by G. B. Soria, a pupil. He died in 1621, aged 87 years. Vincenzo della Greca was another pupil. Apparently, after his death, were published *Scelta di varii tempietti antichi*, fol., Rome, 1624; *Diversi ornamenti capricciosi per depositi o altari*, fol., 1625; *Tabernacoli diversi da Montano, dati in luce da G. B. Soria*, fol., 1628, which has a portrait of Montano; *Architettura con diversi ornamenti cavati dall'antico, dati in luce da C. Perante*, fol., Rome, 1636; and *Raccolta di Tempi et Sepolcri*, 1638. They were also published as *Li cinque libri di Architettura*, fol., Roma, 1680; 1684; and 1691. 5.

MONTANT (Fr. montans), also called MUNTON and MUNNION, see MULLION.

MONTAUBAN (the Latin Albanus Mons, or Mons Aureolus). A town founded 1144, situated in the département Tarn et Garonne in France, at the junction of the rivers Tarn and Tescou. It is the seat of a bishopric founded 1317. A bridge of seven pointed brick arches over the Tarn is one of the most interesting of the mediæval bridges in France; it was proposed as early as 1144, was built 1304, and completed

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1335, for king Philippe le bel; it is 674 ft. 3 in. long between the abutments, 75 ft. high above the bottom of the river, and 56 ft. 6 in. above low water; each arch is nearly 92 ft. high, and 72 ft. wide; the piers are 27 ft. 5 in. thick. The roadway was formed *level*, contrary to the usual custom at the period, but emulating the bridges of the Roman period and that at Avignon; large arches were formed in the piers above the cutwaters, to allow of extra waterway on occasion of floods. A tower was placed at each end, that on the town side was repaired 1569, rebuilt 1574, pulled down 1658; the other next the new suburb, 65 ft. 6 in. high above the road, was replaced 1701 by a triumphal arch of the Doric order. In 1828 footways were added to the bridge, the chapel of S. Catherine on one of the piers removed, and the brick parapets replaced by iron railings. A description, by Devals, is given in DIDRON, *Annales Archéologiques*, xvi, p. 39; a view is shown in NODIER AND TAYLOR, *Languedoc*, fol., Paris, 1833-37, i, pt. 2, p. 66, and both in *Bulletin Archéologique* of La Société Archéologique de Tarn et Garonne, 1869, i, No. 2. Next the town end is the hôtel de ville since 1790, but built 1658 for the episcopal palace out of the ruins of the old castle, erected 1363 by the English, and in which still exists the *salle du Prince Noir*, with a vestibule and several adjoining guard chambers, and their chimneys; the cellars beneath are still filled up. The *salle* is 80 ft. long, 30 ft. wide, and 24 ft. 6 in. high, vaulted in three bays. It is engraved and described in the *Bulletin*, Nos. 1 and 2. The market place forms a square with two tiers of arcades with Doric pilasters, in which eight streets terminate at right angles. The public walks on the highest point of the town are great attractions to strangers. A memorial to the painter Ingres, designed by Etex, was placed 1868-72 in the promenade des Carmes; *ENCYCLOPÉDIE D'ARCHITECTURE*, July 1872, and *ARCHITECT Journal*, 1872, viii, 131. The cathedral, dedicated to S. Martin of Tours, is in the form of a Greek cross, of stone, and was erected 1692-1737 for king Louis XIV. The church of S. Jacques dates from the twelfth cent., of which period is the *bou* of the belltower; the nave and choir are fourteenth cent. work, the vaulting destroyed during the siege was rebuilt by order of cardinal Richelieu, and later. The *beffroi* was part of the hôtel of the family of Lauthier, which had been by them transformed into an hospital by the chief of that family. The parish church has a tower surmounted by a sharply-pointed spire of great height, and said to have been built by the English. The Protestant theological college was founded 1809. LE BRET, *Histoire de la ville*, 4to., Montpellier, 1668.

14. 50. 63.

MONTE-ACUTO (MAGISTER GERARDUS DE). The first stone of the church of the convent of Grandes Carmes in the place Maubert at Paris, was discovered 1812 by Vaudoyer, on which was an inscription recording this name and the dedication of the church in the fourteenth century; as given in LENOIR, *Arch. Monast.*, 4to., Paris, 1852, i, 41.

MONTECAVALLO (ANTONIO) probably designed the palazzo di S. Giorgio at Rome, afterwards called della Cancelleria, as noticed *s.v.* LAZZARI (p. 44); he is said to have used as quarries the Coliseum, the arch of Gordian, and some ancient baths in the villa Ceretti; the granite columns in the two stories of the cortile are said to have belonged to the portico of Pompey and to have been used in the old basilica of S. Lorenzo.

MONTE CANDOGLIO or CANDIDO is situated on the river Toce, a tributary of the lago Maggiore in Italy. It furnishes the white marble which was selected for Milan cathedral as better fitted to stand the atmosphere than Carrara marble. The quarries were given to the fabric by G. G. Visconti, duke of Milan, about 1386, and are still used for the works. Time gives to this marble a fine warm yellow tint. The earlier statues may be of Carrara marble. *SOCIETY OF ARTS Journal*, 1860, p. 568.

MONTE CASSINO, ABBEY OF; see GERMANO (SAN).

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MONTEFIASCONI. A town situated near Viterbo in the Papal States in Italy, near the east shore of lake Bolsena. It occupies the site of an Etruscan city, the *fanum Voltumna* (?) of DENNIS, *Etruria*, 8vo., Lond., 1848, i, 515. It is not well built. The cathedral, dedicated to Sta. Margherita, was designed by A. Picconi, (VASARI, *Flor. edit.*, x, 66), and not by M. Sanmichele as usually stated, and is said to be one of his first works. It is octagonal. A fire of 4th April 1670 left but little more than the bare walls; on 29th April pope Clement X entrusted the restoration to Carlo Fontana, and it was opened 16th December 1674. He designed the cupola, which having failed, was bound by iron chains under his directions. The excavations for the new façade and side towers were commenced 29th Sept. 1840. The church of S. Flaviano, founded 1030, restored by pope Urban IV, 1262, has a broad balconied loggia over a triple arcade at the entrance; the triforium is of such a breadth that it almost forms a second church, and has a second high altar and a bishop's throne, approached by staircases on either side of the high altar which covers the remains of S. Flaviano in the lower church. The pillars are of enormous size, and with rich and curious capitals carved with intricate patterns. Some of the side chapels are in ruins. Frescoes are visible where the whitewash has been removed; in a chapel on the left they are more perfect and are fine specimens of Umbrian art. Bishop Johann Fugger is buried in the lower church under an incised gravestone. Gally KNIGHT, *Eccles. Arch. in Italy*, fol., Lond., 1842, i. The church of the Madonna is by A. Giamberti (da San Gallo) who also designed the fortifications (attributed to Giuliano by MILIZIA), of which in 1759 only some fragments of the walls were visible, for pope Alexander VI (1492-1503) and his son Caesar Borgia.

s. 28. 50. 96.

MONTELUPO (BACCIO DA) properly Bartolommeo Lupi, born 1445 at Monte Lupo near Florence, was chiefly a sculptor, but he designed the triumphal arch in wood and clay at Florence on the visit of pope Leo X; also several works at Lucca including the church of S. Paolino, in which building he was buried at his death in 1534, aged 88 years.

RAFFAELLO, one of his sons, excelled his father in sculpture. Being appointed architect of the castel Sant' Angelo by Tiberio Crispo, castellan, he arranged and decorated many apartments, and executed the angel on the summit of the building; and may have designed some parts of the palace at Bolsena for the same person. Later he retired to Orvieto, where he superintended for many years the erection of the cathedral of that city, designing several chapels. He died in 1588, "becoming old before his time", and was buried in the chapel of Sta. Maria, where an inscription exists, given in DELLA VALLE, *Storia*, 4to. Rome, 1791, p. 323.

s. 73.

MONTEREAU (PIERRE DE), as he is usually called, but DE MONTEUIL as lately designated; SAUVAL, *Histoire*, fol., Paris, 1724, i, 341, styles him "Pierre, né de Amsterole," probably misreading on the tombstone *Musterolus natus* which refers to one of the many Montreuil (Lat. *Monasteriolum*), in France. He was a layman and was taken, but on doubtful testimony, by Saint Louis IX king of France to Egypt. He designed the Sainte chapelle at Vincennes as stated in *Rapport historique sur les progrès des Beaux Arts en France depuis 1789 jusqu'en 1809*, and destroyed for the one commenced 1400 by Charles VI. Illustrations in the *Encyclopédie d'Architecture*, 4to., Paris, 1873. He made large improvements at the abbey of S. Germain des Prés at Paris, including 1239 the dormitory or refectory, and 1245-55 the chapelle de la Vierge; they were destroyed during the revolution, and the site forms part of the rue de l'abbaye; fragments are preserved in the yards of the church at S. Denis. His chief d'œuvre was 1242, consecrated 25th April 1248, the Sainte chapelle de palais at Paris, of two stories, on the site of two oratories. The restoration of the upper chapel was commenced 1837 under Duban, and from 1849-67 under Lassus who also restored the lower chapel. MOROND, *La Sainte chapelle*, 4to.,

Paris, 1790, 18 pl. SOMMERARD, *Les Arts du Moyen Age*, 8vo., Paris, 1838-46, v, 16, and atlas fol., chap. iv, pl. 3. CALLIAT et GUILHERMY, *La Sainte chapelle après les restaurations*, fol., Paris, 1857. Illustrations were published in various volumes of the *Encyclopédie d'Architecture*, 4to. CLUTTON, *On the Sainte chapelle at Paris*, *Ecclesiologist Journal*, 8vo., Lond., 1856, pp. 247-53. DUCLOUX ET DOURY, *Hist. et Arch. de la Sainte Chapelle*, fol., Paris, 1865. Another work attributed to him is the pretty refectory of the abbey S. Martin des Champs at Paris, preserved by chance and discovered shortly before 1834; *Notices sur l'hôtel de Cluny, etc.*, Paris, 1834, p. 150; BRICE, *Nouv. descr. de Paris*, 12mo., Paris, 1725, ii, 39 (also iii, 298; iv, 313).

Pierre died 17th March 1266 and was buried with his wife 'Annes de Montreuil' on the left hand side of the entrance in the choir of his chapel of La Vierge at S. Germain des Prés; the effigy on the tombstone had a rule and compass in one hand; it was broken when the chapel was destroyed. The inscription is given in BOUILLARD, *Hist. de l'abbaye S. Germain*; and in LANCE, *Dict. Biog.*, 8vo., Paris, 1872, ii, 152, who also enters into the question of his birthplace. VIOLLET-LE-DUC, *Dict., s.v. Architecture*, i, 111, and Chapelle, ii, 425, 435.

MONTE VIDEO. A seaport town, the capital of the Republic of Banda Oriental del Uruguay, in South America. It is fortified, and has houses mostly of one story and flat roofed. The cathedral dedicated to S. is the only building deserving of notice. The city suffered severely in the revolution of 1865. A description of the designs for a corn exchange, hotel, shops, etc., forming a block of about 140 ft. by 50 ft., designed by Mr. Empson of Birmingham, is given in BUILDER *Journal*, 1860, xviii, 240. ULLOA, *Voyage to S. America*, 8vo., Lond., 1772, ii, 188.

MONTFERRAND, see RICARD DE MONTFERRAND (A).

MONTFERRAND, in France, see CLERMONT-FERRAND.

MONTGOMERY (JOHN) mason, of Old Rayne in Aberdeenshire, built 1686 the cross at Aberdeen on the site of the ancient one at a cost of £100 sterling; it was removed and rebuilt in 1821 or 1841. The cross is considered the finest of its kind in Scotland. It is 21 ft. in diam. and 18 ft. high. BUILDER *Journal*, ix, 53; xxiv, 187, 247, wherein he is considered also to have built the cross in Old Rayne, which is 12 ft. high, about the same period.

MONTGOLFIER'S machine for raising water, see HYDRAULIC RAM.

MONTHEROULT (PIERRE), master mason, employed upon the church of SS. Gervais et Protas at Gisors, is mentioned in one of the building accounts 1552-53, as receiving 12s. per day. In 1555 he is designated master conductor of the works of the church; DIDRON, *Annales Arch.*, ix. LANCE, *Dict. Biog.*, 1872, p. 149.

MONTI (GIOVANNI GIACOMO), also a painter of architecture, was born 1621 at Bologna. He designed the much admired church of S. Agostino at Modena, now a gymnasium; the church del Corpus Domini, or delle Sante, or Sta. Caterina dei Francescani, at Bologna, completed 1688 by him, also the side organs and the galleries to the choir of the basilica of S. Petronio; the library in the (now suppressed) monastery of S. Michele in bosco; the staircase and lobbies in the palazzo Marescotti; the staircase and prospect loggia in the cortile of the palazzo Pietramellara now Rusconi; and a picture gallery in his own house, now the palazzo Monti. His principal work, begun 1674, was the arcaded portico, a little less than three miles in length with 635 arches, extending from the porta di Saragozza to the church of the Madonna di S. Luca on the monte della Guardia; and he erected 1675 the archway serving as a propylon: it was finished 1739, but he did not live to see it completed, dying in 1692 or 1693. *Illustrations, Arcaded portico*, pl. xl. MALVASIA, *Pittura di Bologna*, 12mo., Bolog., 1766.

s. 103.

MONTIGNY (..... DE). The *halle* at Amiens having been

burnt in 1772, Montigny was invited from Paris to rebuild it; dying before its completion about 1777, Sellier continued the design of his predecessor. GOZE, *Rues d'Amiens*. LANCE, *Dict. Biog.*

MONTIGNY; see GRANDJEAN DE MONTIGNY (A.)

MONTIN, MONTAN, or MONTANT, now called MUNTIN. 4.

MONTLUISANT (.....). In 1750 he was paid an honorarium for designs for the *salle de comédie* built by him at Nancy in Lorraine. In 1766 he was inspector-general of buildings and usines du domaine at Nancy, and restored the hôtel de l'Intendant of the province of Lorraine. He designed in the same year the stabling at the hôtel, which was built in the court on the east side. LEFAGE, *Arch. de Nancy*. LANCE, *Dict. Biog.*, 1872.

MONTMAJEUR ABBEY, in the south of France; see ARLES; and P. MIGNARD.

MONTORFANO (PAOLINO DI), was consulted 21st Nov. 1406 on the works at Milan cathedral: he was probably the Paolino who was also the glass painter. 27.

MONTORSOLI (FRA GIOVANN' AGNOLO), a son of Michele d'Angelo da Poggibonzi, was born 1507 at Montorsoli near Florence, and was chiefly a sculptor of great celebrity. Having worked at various cities, he designed and erected the sepulchral monument for prince Andrea Doria, in the church of S. Matteo at Genoa, constructing the chapel 1525, redecorating the church itself, (an account of which is given in VASARI, *Lives*, v, pp. 101-4); 1522 the palazzo Serra in via Nuova; large additions to the palazzo Doria and laid out the gardens, (as given in GAUTHIER, *Genoa*, fol., Paris, 1818, ii, pl. 51-61); 1547 the fountain on the piazza in front of the cathedral at Messina, assisted by his pupil Martino di Bartolomeo di Firenze (who died at Florence after 1561), given in HITTORFF AND ZANTH, *Arch. Moderne de la Sicile*, fol., Paris, 1822; with another similar fountain near the custom house; twelve chapels of the Corinthian order in the cathedral, only four of which were executed by him; the church of San Lorenzo on the piazza; 1555 the lighthouse; a chapel in the church of San Domenico for the captain general Cicale; 1557 the high altar and tomb in the church of the Servites at Bologna; and in the chapter house of the monastery of the Nunziata at Florence, he erected 1561 a sepulchre for himself and for such other artists as might be unprovided with a burial place of their own. He died 31st August 1563, aged 56 years, and was buried in the abovenamed sepulchre. *Serie degli Uomini illustri*, 4to., Flor., 1773; vi, pp. 57-68, gives a portrait. 14. 30. 73.

MONTTOYA (ANDRES DE), was appointed 1609 assistant to J. B. Monegro in consideration of the advanced age of the latter, in the directorship of the works at the alcazar at Toledo, on the death of F. de las Cuevas, the previous assistant director. The works were constructed from the designs of J. de Herrera, by M. Jamba, P. de Lizargarate, and others, under the supervision of Montoya. On the death of Monegro, 27th Feb. 1621, the books and warrants were transferred to Montoya. The date of his death is not given. 66.

MONTTOYER (.....) was born at Marimont in France. Among his best known works are the rebuilding 1776 of the collège dit du pape founded 1522 by Adrian IV at Louvain, and the corn dépôt in that city. In 1782-84 he carried out the château or palais de Laeken, near Bruxelles, after the plans of the archduke Albert of Saxe-Teschén, then governor of the Pays Bas; he was assisted by the elder Payen; GOETHEBUER, *Choix des Mons.*, fol., Ghent, 1827, pl. 1-3. The theatre, orangery, and decorations of the palace were restored 1815 by G. J. Henri. He also completed 1785 the church of S. Jacques sur Coudenberg at Bruxelles, commenced 1776 by Guimard; the plan is attributed to the elder Payen, by GOETHEBUER, pl. 8: designed the theatre in the *parc* with its vaux-hall or café; a country house near the Namur gate at Bruxelles; the corn dépôt at Gand; with many buildings at Vienne, and in its neighbourhood. He died at Vienne about 1800.

MONTPELLIER. The capital of the department of Hérault, situated in Bas Languedoc, in France. It was built in the tenth century; in 1538 the bishopric of Maguelone was transferred to it. The whole district for a distance of two miles around is studded with handsome country seats, among gardens, orchards, vineyards, etc. The *place de Peyrou*, with an equestrian statue of Louis XIV, forms part of a promenade raised on terraces and considered one of the finest in Europe; at one end is the *château d'eau* which receives its water from an aqueduct erected 1742-52 by Pitot, of seventy arches, each 27 ft. 8 in. span, 3,215 ft. total length, and 92 ft. high, across a valley from the opposite hill; *Detached Essays*, AQUEDUCT, pl. 3 and fig. 14.

The cathedral, dedicated to S. Pierre, is a large edifice having much in the style *Romano-Byzantin*, with many details in the style *ogival secondaire*: the porch with its two round towers is very peculiar. There are seven other Roman Catholic churches, a Protestant church, and a synagogue; besides the old episcopal palace, now a school of medicine; the exchange, having a Corinthian colonnade; the triumphal arch of the Doric order forming the gateway of Peyrou or Pérou, by D'Orbay, carried out 1692 by D'Aviler, who executed the other works of the *place*, the arch is given in DUMONT, *Salles*, fol., Paris, 1774, pl. 17, who also gives the theatre. The école de médecine has a good amphitheatre; the public library; the musée Fabre, a picture gallery; four large and well-managed hospitals, and the palais de justice, deserve notice.

AIGREFEUILLE, *Hist. de la ville de M.*, fol., Mont., 1737-39. FROSSARD, *Nismes*, etc., 8vo., Nismes, 1834-5, ii, 53. NODIER AND TAYLOR, *Languedoc*, fol., Paris, 1833-37, ii, pt. 2, gives the porch of the cathedral, the aqueduct, etc. RENOUVIER ET RICARD, *Des Maîtres de pierre*, etc., de Mont., 4to., Mont. 1844. 14. 50.

MONTREAL. The capital of Lower Canada, and commercial metropolis of the dominion, founded about 1610 on the site of the Indian village of Hochelaga in the island of Montreal, on the river S. Lawrence at a spot where it is about three miles wide. The river is crossed by the Victoria tubular bridge on the line of the Grand Trunk railway connecting Montreal with Toronto. It was commenced 20th July 1854, and completed in the autumn of 1859, but the last stone and rivet were fixed by the prince of Wales 25th August 1860. The engineers were R. Stephenson and A. M. Ross; the contractors Peto, Brassey, and Betts, represented by J. Hodges. The total length is 6,138 ft. or 8,988 ft. with the abutments; the height from the ordinary summer water level is 60 ft. at the centre, and 30 ft. at the end tubes. There are 26 iron tubes, 16 ft. wide and 22 ft. high, joined in lengths of two tubes each about 242 ft. long on piers of 15 ft. in width, specially prepared to resist the crushing effect of the ice, and formed on the rock by coffer dams; and a centre one of 330 ft. at the highest part of the river with piers of 18 ft. in width. The contraction and expansion of the iron work causes a difference of 10 ft. in length. *BUILDER Journal*, 1854, xii, 550; xiv, 78; xvii, 590; xviii, 291, 591, 665, reviewing Hodges' work. *CIVIL ENGINEER*, etc., *Journal*, 1860, xxiii, 157 and 250 with illustrations; 309 and 343, reviewing Hodges, *Victoria Bridge*, elaborately illustrated, 56 pl. fol., Lond., 1860. The bridge is said to have cost about \$6,000,000 or £1,250,000: a model of it, 32 ft. long, was exhibited at the Crystal palace at Sydenham in 1857.

Montreal is a well-built and spacious city. The river bank is lined with noble quays rivalling Bordeaux. The new warehouses, competing with those of London and Manchester, are built of granite. Most of the public buildings are placed in the rue Notre Dame. There is a monument to Nelson, subscribed for in one day, an Ionic pillar 72 ft. high on which is a statue 8 ft. high, finished 1806. The government house; the court house, 1856 (Grecian Ionic) 300 ft. by 70 ft. deep, cost nearly \$300,000; the town hall and Bon-secours market, 500 ft. by 70 ft. (containing in the upper story a ball room capable of seating

4,000 people) fronting the river, this with the interior of the masonic hall, and the French cathedral, are given in the ILLUSTRATED LONDON NEWS, 21st Dec. 1850, xvii: the new gaol; the new large general post office (Italian); and the Quebec barracks, deserve notice.

The French cathedral, built before 1837, now the parish church (Gothic) is 241 ft. long, 135 ft. wide, and 95 ft. high, with a tall triple portal and two towers 213 ft. high: it is capable of holding upwards of 10,000 persons. The Roman Catholic cathedral (Perpendicular Gothic) in the *place d'armes* will hold 10,000 persons. A model for a new cathedral, on that of S. Peter's at Rome, was commenced in 1857; the first stone of the edifice was laid in 1869; the dimensions given are 300 ft. long, 225 ft. wide at transepts, the dome 70 ft. diameter inside, 98 ft. outside, and 250 ft. high to the top of the cross; BUILDING NEWS JOURNAL, 1871, xxi, 313; see vi, 1857, 229. Christ Church, the Anglican cathedral (Early Decorated Gothic), commenced 21st May 1857, by F. Wills, on a model of Salisbury, but smaller in size, and on his death completed by T. S. Scott, to cost £30,000—holding 1,400 to 1,500 persons. It is internally 107 ft. long, the nave 70 ft. 6 in.; the transepts 99 ft. 6 in. by 25 ft.; the tower at the intersection and spire 224 ft. high; the chancel 46 ft. by 28 ft.: BUILDER JOURNAL, xv, 543; xvi, 26. Local stone and Caen stone dressings are used. Among the other (about 30 in 1858) chief ecclesiastical buildings, are the Jesuits' church, with some good paintings; S. James' church, 68 ft. by 62 ft., by Hopkins and Lawford; S. Andrew's (Decorated) 1857, one of the finest, 90 ft. by 65 ft., steeple built 1857; the Unitarian (Byzantine), by Hopkins, Lawford, and Nelson, 84 ft. by 44 ft., the transepts 59 ft. by 27 ft.; and S. James's R. C. (Pointed 13th cent.), which was burnt at end of the year 1858 (BUILDER, xvii, 119).

The hôtel Dieu, a hospital for sick poor, founded 1644; 324 ft. by 468 ft. in depth; the general hospital; the convent of Notre Dame for female instruction, and two other convents; the New College; McGill's college and university, founded 1821, with five professors; theological college (Italian), on the site of the seminary of S. Sulpice; and the law courts, erected about 1800.

The bank of Montreal 1860; Ontario bank 1864, by Lawford and Nelson; City and District savings bank; and the London and Liverpool assurance office (BUILDING NEWS, vi, 58); Colonial Life assurance office; Royal insurance office, by J. W. Hopkins (BUILDER, 1864, xxii, 278; ILLUSTRATED TIMES newspaper, 18th October, 1862, new series, i). The Victoria skating rink by Lawford and Nelson, about 100 ft. and 50 ft. high. The Exhibition building of the Board of Arts, etc., designed by W. J. Hopkins, opened 25th Aug., 1860, is described in BUILDER JOURNAL, xviii, 487, 668; and BUILDING NEWS JOURNAL, vi, 588-9.

A large part of the city was burnt in 1801; another extensive fire took place 8th and 9th July, 1852, destroying 1108 houses; the blowing up of houses by gunpowder is described in *Papers of the Corps of Royal Engineers*, 8vo., Woolwich, 1855, iv, second series, p. 55. BUILDER JOURNAL, x, 32 and 51; ILLUSTRATED LONDON NEWS, August 1852, pp. 89, 92. The MONTREAL HERALD newspaper, 15th September 1863, gives two illustrated sheets of works in progress; also BUILDER JOURNAL, 1857, xv, 466; 1863, xxii, 6-7; BUILDING NEWS JOURNAL, 1860, vi, 183; ILLUSTRATED LONDON NEWS, iv, 312, 319-20. RIPLEY AND DANA, *New American Cycl.*, 8vo., New York, 1861. WELD, *Travels through the States*, 8vo., Lond., 1807, i, 309.

MONTREUIL (Eudes de), is said to have accompanied Saint Louis, king of France, to the Holy Land, where he fortified Jaffa. Returning 1254 to Paris he designed the church and hospital des Quinze Vingts, founded by that monarch for three hundred blind persons, in the rue S. Honoré; it was suppressed 1780; in 1257 the church de la Chartreuse de Vauvert; 1262 that of the Cordeliers, burnt 1580, rebuilt

1582-1606; and 1268 that of Ste. Croix de la Bretonnerie; 1280 commenced the church of Notre Dame at Mantes (WHITTINGTON; BATISSIER, p. 15, or designed some portions of it, DE CAUMONT, *Cours d'Antiq.*, iv, 378; Woods, *Letters*, i, 45; LANCE, *Dict. Biog.*, 1872), according to MILLIN, *Ant. Nat.*, ii, No. 19, who relates that the vaulting being 96 ft. high, the workmen refused to remove the centering until Eudes, to quiet their apprehensions, sent his nephew to assist them. He was also engaged upon the lower part of the choir at Beauvais, "but it does not appear on what authority" (WOILLEZ, p. 5; and DE CAUMONT, iv, 379). The churches of Ste. Catherine du Val des Écoliers, de l'hôtel Dieu, des Blancs Manteaux, des Mathurins, many of the abbeys of Royaumont and Maubuisson; and the abbey at Poissy, where Joscelin de Courvaulx was associated with him (D'ARNOVILLE, *Vies*, and LE NOIR, *Musée*). In 1285 he was architecte du roi, as shown by LEBER, *Coll. des meill. dissert.*, quoted by LANCE, *Dict. Biog.* 1872. He died at Paris 1289, and was buried in the nave of his church of the Cordeliers. *Notice sur l'Hôtel de Cluny*, etc., 8vo., Paris, 1834, p. 149. FELIBIEN, *Arch.*, iv, 219. Early writers have confounded Eudes with P. de MONTEBEAU. 5. 112. 113.

MONTROUGE. A town adjoining the enceinte of Paris, on the road to Orleans. There are several quarries, of which that of Mont Souris supplied the stone for the dome of the church of Ste. Geneviève at Paris. It weighs 128 lbs. per cubic foot Engl.; and requires 6,786 lbs. to crush a cube 1.968 ins. Engl. WARE, *On Vaults*, 8vo., Lond., 1822, p. 25 of Tract 3. The quarry is noticed in DALY, *Revue Générale*, 4to., Paris, 1852, x, pl. 13, p. 334, who also describes other quarries there.

MONUMENT. An erection intended to perpetuate the memory of some event or person. Such is a triumphal arch, a mausoleum, a pyramid, a column, a cross, a figure or statue, an obelisk, a *stèle*, etc. Hence it was not always that the body of a deceased person was buried under it: when such was the case, the term is more properly TOMB; hence grave stone, SEPULCHRAL BRASS, EFFIGY, altar tomb, etc. Where greater honour was intended, a sepulchral or monumental church or chapel has been erected over the burial place. The term itself has been emphatically given to the column in London, designed by Sir C. Wren to commemorate the great fire of 1666. This, with others of like character, has been noticed *s.v.* MEMORIAL COLUMN: other memorials have been erected to individuals, of various designs: thus, 15th May 1850, to Sir John Barrow, at Ulverstone in Lancashire, by A. Trimen, resembling Eddystone lighthouse, 45 ft. diam. at base, tapering to 12 ft., and 100 ft. high; ARCHITECT, etc., JOURNAL, 1850, ii, 246, plans, etc. 17.

MONUMENTAL OR SEPULCHRAL CHAPEL. A small chapel or chantry for the interment of an individual, or a family, and containing their tombs and epitaphs. These chapels were frequently built by lords of manors in parish churches; and by princes and bishops, and other distinguished individuals, in cathedrals. 19.

MONUMENTAL CROSS, see Cross, for those erected to queen Eleanor in England, etc., and the crosses in Ireland and other places.

MONUMENTAL DECORATION, see MURAL DECORATION.

MONUMENTUM ANCYRUM, usually called the Testamentum Augusti, in the temple of Augustus at Ancyra, (ANCOIRA), was described by DONALDSON, at the Institute of British Architects, 28th February 1870, from a work upon it by T. MOMMSEN, 8vo., Berlin, 1865; also PERROT and GUILLAUME, with accurate transcriptions, fol., 1862, and in progress.

MONYAL, MONTALL, MOYNELL, MOYNIELLE. Terms, with MONELLE, etc., used in old documents to signify the MULION of a window. BAYLEY, *Hist. of the Tower*, fol., Lond., 1825, App. xviii. BRAYLEY AND BRITTON, *Palace at Westminster*, 8vo., Lond., 1836, p. 157.

MONZA (the ancient Modetia or Mogontia). A town situated in North Italy, divided into two nearly equal parts by the river Lambro, which is crossed by three bridges. The *duomo* stands where queen Theolinda erected 595 a temple dedicated to S. Giovanni Battista. Its reconstruction was commenced by Matteo di Campione, who began (1850, Hope) the façade and died in 1396. The capitals of the pillars inside are supposed to have been brought from some older building; the pillars of the porch rest upon lions; the edifice is striped with white and black stone bands. The *cantorie* or singers' galleries on each side of the nave are of rich Gothic work—the woodwork of the choir is good. The *pallio*, silver-gilt, is perhaps of the tenth century. The *sacramentaries* of king Berengarius and his queen, date 888. KNIGHT, *Eccles. Arch.*, fol., Lond., 1842-4, ii. The "precious objects" presented by queen Theodelinda are described in *Archæological Journal*, 1857, xiv, 8, by W. Burges. Sta. Maria in Strada, a desecrated church, is remarkable for its very elaborate west front of terra cotta (Third Pointed, Webb), and a fine rose window; GRUNER, *Terra Cotta Arch.*, fol., Lond., 1865, pl. 34-6. The Dominican church dates before 1397; there are others, and that of S. Gerardo, recently completed of a rotunda form. FRISI, *Memorie della Chiesa Monzese*, 4to., Milano, 1774-7. The *Broletto* or town hall is attributed to Frederick Barbarossa, the style is Italian Gothic, with a *ringhiera* between two handsome windows on the south side; it has a lofty campanile with forked battlements. G. Albertoli was engaged to embellish the extensive villa reale erected by Piermarini, 1775-9: ALBERTOLI, *Decorazione di nobili sale*, fol., Mil., 1787, pl. 1-6; pt. ii, pl. 11. There are also a handsome theatre and other public buildings. WEBB, *Ecclesiology*, 8vo., Lond., 1848; STREET, *Brick and Marble Arch.*, 8vo., Lond., 1855. FRISI, *Memorie storiche di Monza e sua Corte*, 3 vols., 4to., Milano, 1794. MILLIN, *Voyage en Italie*, i, 361.

7. 28. 50.

MONZA (NOLFO DA) was a pupil of Bramante, and decorated his church of S. Satiro at Milan. LANZI, *Storia*, transl. by Roscoe, 8vo., Lond., 1852-47, ii, 472.

30.

MOOKERSEY. A red-coloured wood of Tinnevely, used in building in general.

71.

MOOLU VENG. A copper-coloured wood of Travancore, East Indies, used for common buildings.

71.

MOON, TEMPLE TO THE. This should be hypæthral, according to VITRUVIUS, i, 2.

MOORE QUARRY, situated half-a-mile from Ballymena, co. Antrim, in Ireland, supplies a baysalt, crystalline, feldspathic, with olivine; weighing 181 lbs. per cube foot when dry. A stone 3 ins. square with a 12 in. bearing sustained a weight of 13,240 lbs. for fifteen hours, and broke with a weight of 18,760 lbs. WILKINSON *Practical Geology*, etc., 8vo., Lond., 1845.

MOORE'S MODERN ARCHITECTURE, see LOCK BOND.

MOORE'S PATENT LEVER VENTILATOR. An apparatus, formed of narrow plates of glass fixed like louver-board in a frame, and inserted in a square of a sash. Its principle is for the admission of fresh air, directing its current towards the ceiling. The louvres can be opened and shut by means of a wire cord. The patent dates from about 1852. BAILLIE'S VENTILATOR. On 28th May 1846, Moore and Marvin patented an "area grating" on a similar principle of wood or metal plates; *Civil Engineer Journal*, 1847, x, 88.

MOORESQUE OR MAURESQUE ARCHITECTURE, see ARAB ARCHITECTURE, MOORISH ARCHITECTURE, Moresque ARCHITECTURE.

MOORISH ARCH. This may be classed with that of the horseshoe shape, from which it only differs in having a tendency to be pointed at the crown in some examples.

19.

MOORISH ARCHITECTURE in Spain. From the first invasion by the Moors 711, down to their expulsion from Granada 1492, their whole history is mixed up with that of

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the Christians; and, as might be expected, so great was the detestation in which the two races held each other, that neither of them borrowed to any great extent from the art of the other, and accordingly we see two streams of art flowing as it were side by side at the same time, and often in the same district—a circumstance, as need hardly be said, almost, if not quite, unknown at the same period in any other part of Europe. The mosque at Cordoba in the ninth century, the alcazar and giralda at Seville in the thirteenth; the court of lions in the Alhambra in the fourteenth, some of the houses in Toledo in the fifteenth century, are examples of what the Moors were building during the very period of the Middle ages in which all the buildings (Christian) were being erected (described by STREET, *Gothic Architecture in Spain*, 8vo., Lond., 1865); the only exception to be made to this general statement being, that when the Christians vanquished the Moors, they usually continued to allow them to build somewhat in their own fashion, as for example they did at Toledo, whilst on the other hand, the Moors seem never to have imitated this example, though they were of course utterly unable to suppress all evidence in their work of any knowledge of Gothic buildings; pp. 409-10. **MORESQUE ARCHITECTURE, ARAB ARCHITECTURE, MAHOMEDAN ARCHITECTURE.** 14. 25.

To the publications mentioned under the second reference, and ALHAMBRA, CAIRO, etc., can now be added the magnificent one publishing by the Spanish Government, *Monumentos Arquitectonicos de España*, fol., Madrid, 1859, etc. BOURGOIN, *Les Arts Arabes*, etc., fol., Paris, 1868-73. PRISSE D'AVENNES, *L'Art Arabe d'après les Mon. du Kaire*, fol., Paris, 1869-73.

MOORISH BUILDING. The manner of building in Tunis, as described by TEMPLE, *Excursions in the Mediterranean*, 12mo., Lond., 1835; it is without plans. Arches are built by sticking one brick against another with a quick setting cement, until completed; LONDON, *Arch. Mag.*, 8vo., London, 1837, iv, 205.

MOORSHEDEBAD. A city in the presidency of Bengal in Hindostan, situated on the right bank of the river Bagarathy, one of the most sacred affluents of the river Ganges. The town extends eight miles along both sides of the river. The *ghaut* or landing-place is not so solidly constructed as usual, but the height of the banks on which the river stands, the domes and minarets, with terraced houses, present delightful views of Indian scenery. FORREST, *Pict. Tour of the Ganges*, etc., 4to., Lond., 1824, p. 131. The houses are of brick and mean in appearance; the public buildings are in decay.

In the British Museum, Add. MSS. 13904 a b, are two plans of a proposed palace for the nawab Nazim ul Mulluck, designed 10th February 1804, by Edward Tiretta, civil architect to the Hon. Company; this perhaps was not erected, as in Nov. 1838 a special committee of inspection reported to the Indian government on the new palace erected for the nawab Nizam, designed by major-general D. McLeod. It is 425 ft. long by 200 ft. wide (Greek Doric). The works, with the exception of the painting and glazing, had been done by natives. An elevation and plan are given in *Civil Engineer*, etc., *Journal*, 1842, vi, 151; 205. In 1861 a palace was being erected for the nawab Nazim of Bengal under the direction of G. W. Vivian, in the Italian style. The carriage gates 20 ft. high, made to slide, were executed in London and cost about £600.

14.

MOOR STONE. A sort of very coarse granite found in Cornwall and some other parts of England, and of great value for the coarser parts of building; it is also found in immense strata in some parts of Ireland. Its colours are chiefly black and white.

2. 41.

MOOT HALL. A name derived from the Saxon word, to meet. A public building appropriated for persons to assemble in; the same as TOWNHALL. The "moothall" in the ancient and royal manor of Sutton Coldfield, is described in BUILDER

Journal, 1859, xvii, 669; it was designed by G. Bidlake of Wolverhampton, assisted by C. Cooper, surveyor to the corporation. MOAT.

MORA, see MAIRE WOOD.

MORA or MORRA EXCELSA. A strong and durable timber of Demerara in South America, used in shipbuilding, and ranking seventh in the list of first rate timber by the authorities at Lloyds. It is sometimes called Demerara locust wood by shipbuilders. The weight varies from 55 lbs. 12 ozs. to 62 lbs. 13 ozs. per cubic foot. The wood is hard, tough, heavy, and cross-grained. The tree frequently reaches a height of 100 ft. It grows abundantly on barren sand reefs. The trunk when of the height of from 40 to 50 feet will square from 18 ins. to 20 ins., but when of that size it is generally faulty. CARTOON. 71.

MORA (FRANCISCO DE), was a pupil of his uncle, J. Gomez de Mora, and worked under J. de Herrera, on whose health failing, Mora made for him the drawings for the works done after 1587 at Segovia, 1589 at the Escorial, and 1591 at Madrid, and succeeded him at the Escorial on his resignation 1593. During 1577-97, he was engaged at the alcazar of Madrid, and the royal houses called the Campo and the Pardo, including at the latter place, the *casa de oficios*. 1595-6 he designed the chapel in the cathedral of San Segundo at Avila (according to Antonio de Cianca); and at Madrid the bridge of La Piora leading from the Plazuela de los Caños del Peral to that of the Encarnacion; and repaired and enlarged the king's apartment in the convent of Abiojo. In 1598 he went to Malaga for the purpose of making the designs for the choir in the cathedral of that city. About the same time he designed the great hall in the monastery of San Geronimo at Lupiano, as well as the high altar of Nuestra Señora de Montserrat in Catalonia. In this and the following year 1599, he rebuilt the chapel of Nuestra Señora de Atocha, and directed the work of the high altar of La Virgen Pompeo Leoni, at a cost of 1400 ducats. In 1600, Mora undertook the task of partially rebuilding the cloister of S. Felipe el Real, correcting and improving the original design of Andres de Nantes, by removing a great deal of useless ornamentation: it is of granite. In 1604 he was employed to survey the entire edifice of the palace and monastery of the Escorial, succeeding J. d'Herrera, and his works are named *s.v.* In the same year he repaired for Philip III, at an estimated cost of 80,000 ducats, the royal palace of Pardo, which had been injured by a great fire, 13th March. He designed the great stone palace of the duke de Lerma, in the city of that name. The materials for this work he brought from Valladolid; and during a residence in that city he made many designs for buildings, including the Franciscan churches and monasteries of Portaceli and Descalzas. In 1606 he designed the hospital and church of Santo Cristo Zalamea in Extremadura; also 1611 the grand palace of the duke de Uceda at Madrid, now called the *casa de los conserjos* and *oficinas reales*, the most superb edifice in that city—the interior is still unfinished—this appears to have been his last great work. He died 10th August 1611, leaving some buildings to be carried out by other architects; such as the Augustinian nunnery of Sta. Isabel at Madrid, carried out by A. de la Madre de Dios. MILIZIA adds that from the designs of Mora was built a church of wrought stone, at the foot of the hill at Escorial, 150 ft. long and 52 ft. wide. To him is also attributed (as well as to G. Ordoñez) the new church of the Jesuits 1602 at Alcalá de Henares, and some portions of their college; the façade is attributed to J. GOMEZ de Mora, whom he succeeded 11th Feb. 1611 as *maestro mayor* of the royal works. 3. 66.

MORA (JUAN GOMEZ DE), see GOMEZ DE MORA (J.)

MORALES (BENITO DE) of Seville, was appointed 1545, in conjunction with Pedro de Machuca, Fernan Ruiz I, Gaspar de Vega, Diego Fernandez, and Juan Sanchez, to choose a site for the hospital of La Sangre, which he was empowered to

erect with F. Ruiz as joint chief director. In 1570 he was *maestro* of the waterworks of Martos in Andalusia. 66.

MORALES (PEDRO DE) was 1512 *maestro mayor* of the works of the cathedral at Seville, where he re-erected the cupola or dome which had fallen down the preceding year. 66.

MORAND (JEAN ANTOINE), born in 1727 or 1728 at Briançon in France, studied at Lyon, and then at Paris under Servandoni, for whom 1757 he carried out the *salle de spectacle* at Lyon. In 1759 he erected a theatre at Parma, for the marriage of the archduchess with the emperor of Austria. He then went to Rome, and on his return to Lyon, directed the construction of the edifices on the quay S. Clair. In 1774 he designed the timber bridge, and called after him, over the river Rhône; during the siege 1793 he exerted himself to prevent its being destroyed. In 1775 the comte de Provence obtained for him the cordon of S. Michel. He was decapitated 24th or 27th January 1794; CHANDON ET DELANDINE, *Dict. Hist.*

MORANZEL, see TOUROUX DE MORANZEL (L. F.)

MORARD. Abbot in 990, rebuilt by the assistance of Robert the pious, king of France, the abbey of S. Germain des Prés at Paris, completed 1162; *Souvenirs de Paris*, fol., Paris, 1836. He died 1014, and his tomb still remains at the entrance to the choir, by the side of the high altar: it is engraved in LENOIR, *Atlas des Arts*, fol., pl. xiii; and *Musée*, i, pl. xx. Also LENOIR, *Statistique de France*, fol. (church of S. Germain). 7.

MORAY or MURRAY (SAINT GILBERT OF), chamberlain of Scotland, bishop of Caithness 1222, built the cathedral at Dornoch, co. Sutherland, Scotland. GORDON, *Geneal. History of earldom of Sutherland*, fol., Edin., 1813, p. 31, records that "all the glasse which served that church was made by S. Gilbert his appointment besyd Sideray (now Cyderhall), tuo myels by west Dornoch." ROBERTSON, *Early Scotch Architects*, etc., in *Transactions of Arch. Inst. of Scotland*, 1851, i, 55-67. He is the reputed architect of several baronial castles in the north of Scotland, among them the castle and fortress of Kildrum, in Mar, with seven towers within its precinct. He died 1245 at Strabister, at a very advanced age, and was buried under the tower of his cathedral.

MORDO, MOROW or MURDO (JOHN), see MURDO (J.).

MORE (JOHANNES), was clerk of the works at Dublin Castle in the 46th Edward III, 1372, and 4th and 5th Richard II, 1380-82, when money was paid him for repairs there and at the castle of Cathlragh. RECORD COMMISSION; *Rot. Pat. et Claus. Hibern.*, fol., 1828.

MORE (RALPH DE LA), clerk of the works in 1327, 1st Edward III, at Windsor Castle, was to be paid his salary at 2d. (? 2s.) per day, an order renewed in the following year. TIGHE AND DAVIS, p. 133. Alexander the painter and Thomas le rotour were the inspectors of the works.

MOREAU (.....) gained 1743 the *grand prix* of architecture for a chapel, and received his brevet of student of the school at Rome, 6th January 1746.

MOREAU (.....LE), designed 1772 at Paris the house of Nadara-Gonteau, rue de Louis le Grand, and facing the boulevard chaussée d'Antin; given in KRAFFT, *Plans, etc., Maisons et des hôtels*, fol., Paris (1802), pt. 51.

MOREAU (CARL VON) of Vienna, knight of the legion of honour of France, councillor extraordinary of the academy of arts in Vienna; designed at Vienna the Austrian National bank, which was carried out by Raphael von Rigel; also 1822 the exchange; and at Eisenstadt, the prince Esterhazy's palace, one of the most splendid in Hungary, built 1683, but immensely enlarged and beautified 1801-5 by Moreau. 14. 26.

MOREAU (JEAN). After the giving way of the bridge of Notre Dame at Paris, on 8th April 1500, he was consulted with M. Chambiges and other architects, upon the method of construction to be adopted for the foundations of the new bridge. They advocated masonry in preference to piling as

suggested by the carpenters. LEROUX DE LANCY, *Pont Notre Dame*.

MOREAU (JEAN CHARLES ALEXANDRE), also a painter, born at Rimaucour, near Neufchâteau (Haute Marne), obtained 1785 the *grand prix* of architecture for a sepulchral chapel, given in ALLAIS, *Projets d'Arch. grands prix*, fol., Paris, 1806. After passing four years in Italy, he returned to Paris and studied painting under David. In 1799 he reconstructed or redecored the salle du théâtre Français. His design in competition for a monumental column to the glory of the French armies obtained a first rank, and a model of it was erected in the place de la Concorde, of wood and painted cloth, but the idea was abandoned: it is engraved in the *Annales des musées*, etc., i. He published *Fragments et ornements d'arch.—d'après l'antique, supplément à l'œuvre de Desgodetz*, fol., Paris, 1802. He died in Paris probably soon afterwards. LANCE, *Dict. Biog.* 1872.

MOREAU (PAUL), designed 1843 a house at Villeneuve S. Georges, illustrated in NORMAND, *Paris Moderne*, 4to., Paris, 1849, pl. 69-71. Another MOREAU designed the galleries d'exposition de l'industrie nationale, in the place de la Concorde 1834; and 1840 that in the great square of the Champs Elysées, given in GOURLIER, etc., *Choix d'Edifices*, fol., Paris, 1850, iii, pl. 192.

MOREAU DESPROUX (PIERRE LOUIS), pupil of Beausire, was 1763-89 master-general of the buildings of the city of Paris, and was also architect du roi. He gained the third and second prizes, and 24th January 1754 the studentship at Rome, where he was accompanied by de Wailly; and 7th April 1762 he was admitted into the academy of architecture. After the fire of 1763, he rebuilt the salle de l'opéra, and the façade of the Palais Royal, rue S. Honoré (the other works of the palais were by Contant); the *salle* given in DUMONT, *Recueil*, fol., Paris, 1767, was burnt 8th June 1781. In 1773 he began to build a theatre for French comedy upon the site of the hôtel de Condé; the works were stopped in 1779, the site changed and M. J. Peyre and de Wailly employed to design the Odéon (CHALGRIN): 1772-88 he directed the continuation of the portico to the church of S. Eustache, which had been commenced 1754 by Mansart de Jouy; it was incomplete in 1808. He also designed the hôtel de Chavannes, rue des Fossés du Temple, and the fountain du Chaume, rue des Vieilles Haudriettes. Moreau competed for the hôtel des monnaies, built 1768-75 by J. D. Antoine; and was engaged on the new buildings of the palais de justice with Desmaisons and Couture: and was perhaps the Moreau who altered the interior of the théâtre de la comédie Française, designed by V. Louis. He was decapitated in 1793; LANCE, *Dict. Biog.*, 1872. BLONDEL, *Cours*, 8vo., Paris, 1771, ii, 265.

MOREELSE (PAULUS), born at Utrecht, was counsellor and treasurer of that city. He studied painting in Italy, and designed the Katherinen gate at Utrecht, which bears his initials. He died there 1638, while filling the office of burgomaster. "Paulo Morelson, peintre et architecte de Utrecht", is mentioned in C. DE PASSE, *Della Luce*, etc., fol., Amst., 1643.

MORELIAM (ALEXANDER), mason, 1631, executed the repairs to the church of S. Dunstan's in the East, including the steeple, the church, and all the windows, and all other mason's work, for which he contracted at £675. LAING, *Custom House*, etc., fol., Lond., 1818, p. 87.

MOREL (JEAN MARIE), born at Lyon 28th March 1728, was appointed at eighteen years of age architect to the prince de Conti, for whom he laid out the gardens of the château de l'Île Adam; and for the duke d'Aumont, those at the château de Guiscard (one of his best works), the park and lake were laid out after the English fashion; it is illustrated in LABORDE, *Nouv. jardins de France*, fol., Paris, 1808-15, pl. 86-7. He published *L'art de distribuer les jardins suivant l'usage Chinois*, Lond., 1757. *La théorie du jardin* (anon.), Paris, 1776. He died 10th August 1810, in the département

du Rhône. FORTAIR, *Discours sur la vie et les œuvres de J. M. Morel, Archt.*, 8vo., Paris, 1813. LANCE, *Dict. Biog.*, 1872. 89.

MOREL (PIERRE), built 1406 the church and monastery of the Celestins at Avignon. ACHARD, *Note*, etc., in LANCE, *Dict. Biog.*, 1872.

MORELLI (COSIMO), born at Imola in 1732, was son of Domenico, also an architect, and studied under Domenico Trifogli. For his early patron Gioan Carlo Bandi, bishop of Imola, he made 1752-82 designs for rebuilding the cathedral; G. A. Braschi, pope Pius VI (1775-1800), appointed him city architect at Cesena, and for him he made a design for a new sacristy at S. Peter's at Rome, not executed. He also modernised, if not rebuilt, the interior of the church at Fermo; rebuilt the *duomo* at Macerata; designed 1772-84 the cathedral at Fossombrone; the church of S. Petronio at Castel Bolognese; a church at Barbiano; a church for the nuns of S. Chiara at Imola, that of S. Stefano, and 1785-95 that of S. Maria in Regola, in the same city; a church at Lugo; some alterations in the metropolitan church at Ravenna; the theatres at Imola, about 1780, burnt in 1796 (when it was rebuilt 1812 by Magistrelli), but the designs were published by MORELLI, *Piante e Spaccato del nuovo teatro*, fol., Rome, 1780; that of dell'Aquila at Fermo, one of the largest and finest works of its class in Italy; at Jesi, at Osimo, and 1795-98 at Ferrara, although this latter is claimed for A. Foschini; it is another of the large Italian theatres; the palazzo Braschi at Rome; the Anguisola at Piacenza; the Berio at Naples; the Cappi at Bologna; and the façade of the ridotto at Cesena; with the hospital, the façade of the palazzo pubblico, and the palazzo vescovile, at Imola. He is said to have furnished a design for a stone bridge at Londonderry, (MILIZIA, *Opere*, 1827, iv, 477). He died after a severe paralytic attack in Feb. 1812, and was buried in the cathedral at Imola. PAPOTTI in TRIPALDO, *Biographia*, iii, 1836. 14.

MORENO (ALONSO). A resident in Marchena, was a pupil of Bartolomé Zumbigo, and became architect and *maestro mayor* of the works to the duke de Arcos. He assisted his master in the works at the Escorial, at Madrid and at Toledo. Afterwards (in 1691) for the chapter of Seville, in conjunction with Fra Antonio de la Concepcion, a monk of the order of La Merced, he examined the condition of the works of the *Sagrario*, in which divine services had been suspended in consequence of the damage done by the earthquake of 9th October 1680. 66.

MORENO MELENDEZ (DIEGO), *maestro mayor* of architecture to the city of Jerez de la Frontera, was appointed 13th September 1694, in conjunction with A. Gonzales, *maestro mayor* of architecture of civil and military works, P. Romero, *maestro mayor* and architect to the Duke of Medina Sidonia, and F. Gomez Septier, *maestro mayor arquitecto* of the church itself, to survey and report upon the mode of prosecuting the new works of the collegiate church of S. Salvador in Seville. The document is given by LLAGUNA. 66.

MORESQUE ARCHITECTURE. A variety of Moorish architecture, being the work of Moorish workmen, executed for their Christian masters, as explained by STREET, *Gothic Arch. in Spain*, 8vo., Lond., 1865, 410-1. Of these works, the most remarkable he had seen were in the city of Toledo. The very planning of the town, the arrangement of the houses, their *patios* or courts, large halls; the design of the internal finishing and decorations of the houses and rooms is thoroughly Moorish, executed with the remarkable skill in plaster for which the Moors were noted, and with curious exhibitions here and there of a knowledge, on the part of the men who did them, of the Gothic details which were most in vogue at the time. He gives the following examples: in Toledo cathedral, the triforium of the choir is decidedly Moresque in its design, though it is Gothic in all its details; the triforium of the inner aisle; and that at the east end of Avila cathedral.

The towers of the Christian churches at Toledo, Illescas, Calatayud, Zaragoza, and Tarazona, all appear to be completely Moresque. He gives many instances of some small portions of Moorish ornament introduced by the Christian workman evidently as a curiosity, and as it were to show that he knew how to do it, but did not choose to do much of it. The introduction of coupled groining ribs, as in the Templars' church at Segovia, and chapter house at Salamanca; the Moorish battlement, which is weathered on all sides to a point; their system of plastering; and their peculiar carpentry, as constantly introduced in late Gothic work; and other points to which he directs attention. GIRAULT DE PRANGÉY, *Essai sur l'Architecture des Arabes*, 8vo., Paris, 1841, p. 68, prefers the term Mauresque to Moresque.

MOREWOOD'S patent for coating iron with tin; see GALVANIZED IRON; the CIVIL ENGINEER, etc., *Journal*, 1845, viii, 31, gives the description of the patent of December 1844.

MORGUE, see DEAD HOUSE, SICK HOUSE, and MORTUARY HOUSE.

MORIN (GUILLAUME) was one of the architects (?) of the church of S. Ouen at Caudebec. In one of the rolls of expenses 1501 to 1506 he was paid 118 sols tournois for works to the church, fortifications, and fountains of the city. LANCE, *Biog. Dict.*, 1872.

MORIS (FRANÇOIS), is considered to have been the architect of the hôtel de ville at Gray (Haute Saône), commenced in 1568; as he had the charge of the masonry of that town; GATIN ET BESSON, *Hist. de la ville*.

MORISTAN. The Arabic term for an hospital of a certain class. It appears that this term had sometimes a double meaning, that is an hospital, as well as an asylum for the needy; but perhaps "needy" means travellers, who then were nearly all traders. In the *moristân* at Cairo is a court for camels and baggage. The *moristân* at Granada, a two-storied *khan*, built *cir.* 1375, by Abou-abd-allah-Mohammed, perhaps destroyed about 1844, is given in GAILHABAUD, *Arch. du Moyen Age*, 4to., Paris, 1858, iii. The *moristân* at Constantinople is a hospital for idiots; EVLIYA, *Narrative*, 4to., Lond., 1834-50, i, p. 174.

MORLANES (JUAN and DAMIAN or Diego), also called Forment, were sculptors of Valenza, in Spain; the father worked at the monastery of Sart' Engracia at Zaragoza, for Ferdinand VI; and the son is said to have given the plan for the church: others say they both designed the façade of the church, which is 60 ft. long and 105 ft. high: and also executed 1520-33 the alabaster altar screen in the cathedral at Huesca, both with three orders of architecture. Their other works of carving are noticed in LLAGUNO. 3. 65. 66.

MORMANDO (FRANCESCO or GIAN FRANCESCO), was born about 1455 at Mormanno in Calabria Citra, and became a pupil of Agnolo and of L. B. Alberti. He studied the antiquities at Rome, and then settled at Naples, where 1490 he enlarged and modernised the Benedictine monastery of SS. Severino e Sossio, at Naples (the dome, the first of the sort erected at Naples was executed by his pupil, S. di Giovanni, from a model by Mormando). Ferdinand invited him to Spain to erect a church and a palace, and appointed him his first architect, but he returned to Naples without doing so. The palazzi he built were: Castelluccio (much altered); Coscia; Filomarino afterwards Corigliano (upper part rebuilt on a different design since the earthquake of 1688); Regina (except the entrance portal and other alterations made about the close of the seventeenth century; and Cantalupo on the river Posillipo. The small church della Stella, near San Severino, was rebuilt and endowed 1519 at his expense. He died 1552 at Naples, aged about 97. His portrait is in *Biografia degli Uomini illustri—di Napoli*, 4to., Naples, 1820, vii. 3. 28. 36. 95.

MORNING ROOM. An apartment introduced of late years in superior mansions primarily to relieve the drawing room, by the occupation of it by the family in the earlier part

of the day. In more homely houses it is often the breakfast room; luncheon or the children's dinner may be served in it, and occasionally, the family if small, continuing there afterwards. The aspect should be easterly to have the benefit of the early sun, but so placed that the glare of it may have escaped by the breakfast hour; if used afterwards a somewhat more southerly aspect is essential. A pleasing prospect is desirable for such a room. Dwarf cupboards, or a cheffonier, and a roomy closet are useful additions. The internal position of this room ought to be in connection with the drawing-room; KERR, *The Gentleman's House*, 8vo., Lond., 1871, 3rd edit., pp. 48-103.

The morning room is also essential in most club houses, where it is used as the reading and general meeting room. A list of the sizes, considered necessary, of those supplied 1847 in the competitive designs for the new Army and Navy club house, are given in CIVIL ENGINEER, etc., *Journal*, 1847, x, 231. They vary from 42 ft. by 29 ft., up to 98 ft. by 21 ft., the average being about 53 ft. by 30 ft. The room at the Travellers' club is 43 ft. 6 in. by 24 ft. 6 in.; at the Reform club, 58 ft. by 28 ft.; and at the Conservative club, 92 ft. by 26 ft. 6 in.

MOROCCO, see MAROCCO.

MORONE (ANDREA), is said to have designed 1532-49 the church of Sta. Giustina at Padua (*Handbook for North Italy* 1847), but it is generally considered that it was commenced about 1502 by G. da Brescia, and continued by A. Briosco (MILIZIA adds, with A. Leopardo of Venice: ROSETTI, *Padova*, 8vo., Padua, 1765, p. 190, says Briosco and Morone); it was completed about 1549.

MORONI (GIACOMO) and MOROSINO (GIORGIO), were both consulted on the works at Milan cathedral on the 14th Sept. 1399. 27.

MOROW (JOHN), see MURDO (J.)

MORRELL. A timber of Western Australia: see EUCLYPTUS.

MORRIS (ROBERT) of Twickenham, subscriber to *Views of London Churches*, obl. fol., Lond., 1736, and to PRICE, *Salisbury Cath.*, 4to., 1753; published *Essay in defence of Ancient Architecture*; or a parallel of the ancient buildings with the modern, 16 pl., 4to., Lond., 1728; and *Lectures on Architecture*, etc., 8vo., Lond., 1734; 1759, in which work he refers to his kinsman ROGER MORRIS, architect, as one whose productions were of merit, and to whom he "was indebted for the erudition he had received in his service". As the plates undermentioned have only the words "R. Morris", it becomes doubtful to which of these two persons they are to be ascribed; probably the books to ROBERT, and the designs to ROGER. The *Lectures* were delivered monthly at a "Society for the improvement of knowledge in Arts and Sciences", which ROBERT had proposed and established about 1730. The other publications are, *Rural Architecture*; designs, etc., 50 pl., 4to., 1750. *Architectural Remembrancer*, 8vo., Lond., 1751. *Architecture Improved*; or designs for slight and graceful recesses, lodges, etc., 50 pl., 8vo., 1755. *Select Architecture*; designs from a town house to an hotel, and from a farm house to a parish church, 50 pl., 2nd edit., 4to. (about 1759). With Halfpenny and Lightoler, *The Modern Builder's Assistant*, or a concise epitome of the whole system of architecture, etc., 85 pl., fol., Lond., 1757.

The earliest design known, and probably by ROGER, is 1745 Inverary castle, for the duke of Argyll (Gothic); the south front is given in ADAM, *Vitruvius Scoticus*, fol., Edinb. (1720-40; 1810), pl. 71-3-4; it was commenced 1745, and stopped, but completed within a few years from that time. "It is built of lapis ollaris or pot stone of a grey sombre hue, which is soft under friction, but admits of a fine polish, and is capable of resisting the effects of the weather as well as the hardest marble; the stone was brought from the opposite shore of Loch Fyne": NEALE, *Seats*, 4to., Lond., 1822, ser. 1, v. The centre portion of the lodge, Richmond Park, for king George II, with S. Wright; the wings were added by the princess Amelia;

WOOLFE AND GANDON, *Vib. Brit.*, fol., Lond., 1767, i, pl. 4. a house for lord Melcomb and Thomas Wyndham, esq., on the river Thames, near Hammersmith; *idem*, pl. 29: (the gallery by Servandoni). Coomb Bank, Kent, for the duke of Argyll; *idem*, pl. 75-77. Wimbledon Park, in Surrey, for the earl Spencer, burnt Easter Monday 1785, after which the offices were used as a residence; *idem*, 1771, ii, pl. 21. About 1750 Kirby Hall, Yorkshire, with the earl of Burlington for John Thompson, esq.; "the plans by the owner S. T(hompson)", executed and the interior by J. Carr; *idem*, ii, pl. 71. Lastly a bridge at Wilton erected 1736 for Henry Herbert, earl of Pembroke; *idem*, ii, pl. 89.

MORRISON. Four generations of this family practised the profession. It resided for several generations at Middleton, co. Cork, in Ireland. JOHN MORRISON was celebrated for his mathematical, scientific, and architectural abilities, many specimens of the latter remaining in that part of Ireland.

MORRISON (SIR RICHARD), born about 1767, the son of JOHN, being destined for the church, left his native county early in life, and on arriving in Dublin became a pupil of J. Gandon, and obtained an appointment in the Ordnance department through the influence of his godfather the earl of Shannon, which enabled him to pursue his studies; and shortly afterwards he carried out considerable alterations at the cathedral at Cashel. He then resided for some time at Clonmel, where he designed the county Court house for Tipperary; and 1793 published a volume of *Designs*. About 1800 he removed to Dublin, and resided at Walcot near Bray, where he continued until his death. In 1807-8 he designed Bear Forest, co. Cork, for R. de la Cour, esq. (view in NEALE, *Seats*, 4to., Lond., 1820, vi); altered and erected offices at Castle Freke, co. Cork, for lord Carberry (*idem*); about 1809 designed Ballyheige castle, co. Kerry, for col. James Crosbie (*idem*), from a design by his son WILLIAM, then only fifteen years of age, who from his talents was thenceforward a valuable assistant to his father; 1811, Castle Howard, co. Wicklow, for lieut.-col. Howard (*idem*); 1812, Moldrum castle, co. Westmeath, for lord Castlemaine (*idem*); 1812-15, court house and gaol, at Galway; 1816-19, the Roman Catholic cathedral at Dublin; before 1819, the remodelling of the interior of Thomastown house, co. Tipperary, for the earl of Llandaff (*idem*); before 1820, Crotto house, co. Kerry, for major Ponsonby, the house was built 1669 (*idem*); before 1820, works at Mount Bellew, co. Galway, for C. D. Bellew, esq. (*idem*); S. Clersons, Galway, for J. H. Burk, esq. (*idem*); Castle Richard, co. Waterford, for H. Bush, esq. (*idem*); Shelton abbey for the earl of Wicklow, retaining a great portion of the old fabric in 14th century Gothic (*idem*); before 1821, considerable additions to Kilruddery Hall, co. Wicklow, for the earl of Meath, in a florid Tudor Gothic (*idem*); the portico (if not the mansion) at Lyons, co. Kildare, for lord Cloncurry (NEALE, ser. 2, ii); before 1828, Ballyfina, Queen's County, for Sir C. H. Coote, bart., in the Grecian style (*idem*); offices at Castle Coole, co. Fermanagh, for the earl of Belmore, the house was built by J. Wyatt (NEALE, ser. 2, v); and the enlargement of Foaty house, near Cork, for J. S. Barry, esq. (*idem*, ser. 2, iv). He was last employed for lord Longford and the earl of Howth. He was knighted during the vicereignty of the earl de Grey. He died 31st Oct. 1849, aged 83 years, and was buried in Mount Jerome cemetery. He was president of the Institute of Architects of Ireland.

MORRISON (WILLIAM VITRUVIUS), son of the above, was born April 22nd 1794, at Clonmel, co. Tipperary. In 1821 he visited Rome, the south of Italy, Paris, and the chief edifices in England, where he especially studied the Tudor style, of which there was probably no example in Ireland before its introduction there in his or his father's works. For some time after his return he worked with his father, but soon he pursued his career independently, extending his attention to all the details of the interior of his buildings, designing the furniture,

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laying out the grounds, etc. Ill health arising from a delicate constitution and overwork, caused him again to visit the continent, residing at Nismes, and visiting the Pyrenees; but having a serious attack at Bordeaux in 1837, he returned to Ireland, and died at his father's residence, Vaucluse, near Bray, on 16th October 1838, aged forty-four years. He was buried in Mount Jerome cemetery, near Dublin. He was a member of the Royal Irish Academy.

Besides his share in the edifices carried out with his father, he designed before 1819 Borris house, co. Carlow, for Walter Kavanagh, esq. (NEALE, vi); Miltown, co. Kerry, for sir John Godfrey, bart. (*idem*); Oak Park, co. Carlow, for col. Bruen; Glenarm castle, co. Antrim, for countess of Antrim (NEALE, ser. 2, ii); Hollybrooke, co. Wicklow, for sir George Hodson, bart.; Baron's court, co. Tyrone, for marquis of Abercorn (Grecian); Clontarf castle, co. Dublin, for John E. V. Vernon, esq.; Oxmean, near Belfast, for marquis of Donegal; Ballygiblin, near Mallow, co. Cork, for sir W. W. Beecher, bart.; Mount Stewart, Newtown Ards, co. Down, for marquis of Londonderry; Brittas castle, co. Tipperary, for capt. Langley, in imitation of the ancient English baronial castles, but it was never completed; the priory, co. Tipperary, for sir Henry Carden, bart.; a Swiss cottage at Lough Bray, co. Wicklow, for sir Philip Crampton, bart.; the court house, at Carlow (Grecian); the court house at Tralee; the gaol at Wicklow; Fassero, near Bray, co. Wicklow, for judge Crampton; a cottage at Ross-Trevor, co. Down, for S. Hamilton, esq.; the anatomy house 1824 at Trinity college, Dublin; a monument to general Ross, at Ross-Trevor, co. Down; and another to capt. Skinner, at Holyhead. Memoir in DUBLIN BUILDER *Journal*, 4to., Dublin, 1859, pp. 73 and 74, by E. A. M.; and in NEALE, *Quarterly Papers on Arch.*, 4to., Lond., 1843, i, by his brother John. (BUILDER *Journal*, 1850, viii, 451; 521 gives his design for Foaty house, near Cork).

MORTAGNE (ETIENNE DE), was one of the first architects of the cathedral at Tours, begun 1170. It is also possible that he built the large church at Marmoutier, as that name occurs 19th Oct. 1279 in an account of expenses; he died 1293; and was probably buried at the foot of the staircase in the chapel of S. Martin. LANCE, *Dict. Biog.*, 1872.

MORTAR (Lat. *materia*, in VITRUVIUS; It. *malta*; Sp. *argamassa*; Fr. *mortier*; *gacher*, to mix mortar; Ger. *mörtel*). A material used in building operations to unite the brick or stone in one uniform homogeneous mass, and composed of quicklime, with a due proportion of sand and water. This proportion depends mainly upon the quality of the lime, which is obtained by burning chalk, stone, shells or other calcareous material. Of late years a mortar has been largely used in some districts made of burnt clay ground up with lime in a mill; sometimes also plaster rubbish has been used, with or without a proportion of fresh lime. Many inferior materials have likewise been utilised, as road drift, "putrid slop" (BUILDER *Journal*, 1862, xx, 593), garden mould (B. J., xxi, 486, 608), etc.; but from the peculiar affinity of lime for silica, no better material can be trusted where strength is required than river sand, if from a clear stream; or well washed, if it be loamy or dirty; if obtained from pits, or from the sea shore, it must be well washed from all loamy or saline particles—the latter especially; or road drift from hard macadamised roads, well weathered, so that all vegetable or earthy matters are washed out. When dirty sand is used, and the lime itself is imperfectly burnt, the mortar never solidifies, and there is no adhesion to the bricks. MORTAR MILL.

Lime mortar is slow setting, in contradistinction to CEMENT which is quick setting. The induration or setting of mortar has perhaps not yet been fully elucidated, although it has undergone many investigations. It has been stated that the hardness of mortar is obtained by the induration or solidification of water by hydrate of lime; DINSDALE, in CIVIL ENGINEER, etc., *Journal*, 1845, vii, 312. Messrs. Abel and Bloxham assign as

one of the causes of the hardening of mortars, the formation and subsequent crystallisation of carbonate of lime; *BUILDING News Journal*, 1869, xvii, 63. It is considered that all limes harden at first solely in consequence of the crystallisation of the hydrate, formed by the presentation of water to the caustic lime; the effect of the absorption of carbonic acid from the atmosphere, as so much talked of, is very gradual, it may be almost said indeed to be always in progress, for the proverb that "mortar a hundred years old is but a child", is almost literally true—of the moderately hydraulic class especially. All caustic limes, moreover, undergo a change of form in passing into the state of hydrate, and it must therefore be essential that the whole of that process should be completed before the mortar into which those limes enter is used. This important point is the subject of a chapter in REID, *On Concrete*, 8vo., Lond., 1869, wherein he states that "considerable doubt and uncertainty still surround it". He thus defines the terms setting and hardening: the duration of the process of setting depends entirely on the quality of lime or cement used, and may extend from a quarter of an hour to six days or even longer. Hardening or ultimate induration continues for thousands of years, provided the necessary conditions have been duly observed in the preparation of the mortar; otherwise the mass soon gives indications of decay, and in such cases produces a mortar or concrete of dangerous quality, which age, instead of improving, deteriorates.

Among the limestones used in the manufacture of lime, are grey chalk, and the chalk marl or Dorking lime, found in great quantities at Dorking, Merstham, and Halling. The common London mortar is usually made of one part of white chalk lime, and 2 or 2½ of clean sharp river sand. White lime when really good will take a larger proportion of sand than brown limes, but it is an additional proof of the badness of common chalk lime, that in the London practice the reverse generally prevails. The Dorking grey chalk lime is used in proportions of 1 of lime to 3 or 3½ of sharp river sand; or 2 of lime to 5 of sand; and for filling in the interstices of thick walls, 1 of lime to 4 of coarse gravelly sand; Aikin, *Illustr. of Arts and Sciences*, 1841: as in the *CIVIL ENGINEER*, etc., *Journal*, 1841, p. 363. Lime from the magnesian limestone formation is advocated for the hardness obtained, in 1 of lime to 2 of sand, in *BUILDER Journal*, 1845, p. 416.

All rich, fat, or very meagre limes should be slaked a long time before being used, and kept submersed or covered over. Limes that are moderately or even slightly hydraulic should not be disturbed after the setting properties have once been called into action.

In 1818 Dr. John of Berlin presented a memoir to the Society of Sciences in Holland, which was premiated by them, in reply to the question propounded, "What is the chemical cause in virtue whereof stone lime makes generally more solid and durable masonry than shell lime, and what are the means of improving shell lime in this respect": it was published in 1819.

REID, *Practical Treatise on Concrete*, etc., 8vo., Lond., 1869, gives several tables of the physical characteristics of Roman mortars, from the works of Dr. John, Vicat, Malcolmson, W. Wallace, and J. Spiller; and the characters, etc., and resistance of others from the south of France. The size of the pieces operated upon measured 18 in. by 2 in. by 3½ in., and exhibit remarkable results, when the difficulty which must have been experienced in obtaining pieces of the necessary dimensions is considered. It affords another proof of the careful attention paid by Roman builders to the quality of their mortars, and the extreme caution displayed by them in rejecting sand of a loamy or soft character. None of the samples contain fine sand, and where the matrix is incorporated with a powder, it is only of a kind having the property of imparting setting energy to it. Pozzuolana, brick dust, and charcoal powder, severally appear as aids to the lime, and the aggregates are only remarkable for their coarseness and irregularity.

VITRUVIUS, *De Arch.*, ii, 5, relates the nature of lime burnt from white stone or flint; the harder being best for walls, the more porous for plaster. Three parts of pit sand to one of lime; or two parts of river or sea sand, to the latter; one third part of potsherds ground and passed through a sieve improves it.

"Mortar the elder that it is, the better it is found in building. Moreover, in the old laws which provide for the perpetuity of houses in ancient time, we find it expressly set downe, that the undertaker to build a house at a certain price, shall use no mortar under three years of age: and this was the reason that in those daies a man should not see any rough-cast or parget to rise or chawne illfavouredly as now they doe." PLINY, transl. by HOLLAND, fol., Lond., 1601, b. 36, ch. xxiii; who also states that three coats of mortar of sand and lime, and two more of lime and marble grit, are required to be permanent, fair, and resplendent.

An analysis of other ancient mortars is given in *BUILDER Journal*, 1865, xii, 308. *Remarks on the mortar used in ancient buildings*, with notes for preparing mortars in a more perfect manner than that now in practice, by J. Gibb, in *CIVIL ENGINEER*, etc., *Journal*, 1841, iv, 46. Mortar used at the great pyramid at Gheezeh, for the casing and for the lining of the passages, is entirely of lime; in the body of the pyramid it is composed of ground red brick, gravel, Nile earth, crushed granite, or of calcareous stone, and lime. In some parts a grout or liquid mortar of desert sand and gravel only; PERRING and VYSE, *Pyramids*, fol., Lond., 1839-42. The mortar used in the temple to S. John the Baptist at Constantinople, built for the emperor Justinian (527-566), was composed of quicklime, pounded earthenware, and elm bark, mixed with hot water, in which barley had been boiled, into a paste, and applied tepid, because it adhered the better and made the stones stick together with the strength of iron; CODINUS, *De Orig. Constant.*, quoted in *BUILDER Journal*, 1849, vii, pp. 593, 608. The sand for the mortar used in building the dagobas in Ceylon, was pounded, sifted, and ground on a grinding stone; while in the palaces built cir. 600, the mortar still shows the remains of the pearl oyster shells from which it was burnt, and the *chunam* with which the walls were coated; TENNANT, *Ceylon*, 1859; and *BUILDER Journal*, xviii, 55.

Lyminge church, Kent, is an example of Roman bricks and masses of reddish concrete, built and imbedded in the yellow Saxon mortar; JENKINS, *Church or minster of Lyminge*, 8vo., Lond., 1859.

Bishop Gundulph (1077-1108) is stated to have mixed blood with lime to make it hard. "1230. Three-and-a-half pounds of wax for cement (*ad cimentum*), at 6d. per lb.; for one iron dish (*patella*) in which the cement is burnt and made", used at Rockingham castle; *Archeological Journal*, 1814, i, 373. In 1300, wax was purchased to mix with mortar; OLIVER, *Exeter*, 8vo., Exeter, 1861, p. 186. In a tract on Old Charing Cross, it is mentioned that it was "so cemented (cir. 1300) with mortar made of purest lime, callis sand, white of eggs, and the strongest wort, that it defied all hammers and hatchets whatsoever"; BLAKEWAY and OWEN, *Shrewsbury*, 4to., Lond., 1825, ii, 361.

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|--|----|----|
| 1324-7. Edward II, Works at Westminster. | s. | d. |
| 1 cwt. lime | 4 | 0 |
| 60 lbs. pitch, bought for making cement for the gutter of Marcul's chamber | 3 | 0 |
| 100 of Flanders tiles, to be pulverised for making the same cement | 1 | 0 |
| 3 yellow dishes to make the cement in | 0 | 6 |
| 12 cart loads of sand, 1d. per load | 1 | 0 |
| | 9 | 6 |

BRAYLEY and BRITTON, *Westm. Palace*, 8vo., Lond., 1837, p. 124; who also notice that in 1330-32, wax and pitch were bought for cement (pp. 151, 153, 155); and that a hundred of lime cost 3s. 6d., and four cart-loads of sand 4d. (p. 152), for

the great window of the chapel; SMITH, *Antiq. of Westm.*, 4to., Lond., 1807, p. 185. CHAUCER (1328-1409), in *Romaunt of the Rose*, states the castles were built of very costly liquor, of piercing lime, which was tempered with vinegar. Slaked lime (1342) for whitening the walls and making mortar, at Westminster, is noticed in SCOTT, *Gleanings*, 1861, p. 23, by Mr. Burt. HORMANUS, *Vulgaria*, 1519, p. 242 b., notices mortar being tempered with hot water. 1565, "paid for eges and gathering blood to make morthier, xiid."; HUNTER, *Shelfield*, 1819, p. 140.

Mortar in 1627-28, was made of lime, alum, egg and strong wort; BRITTON, *Antiquities*, iv, s.v. Louth, p. 6. In 1605, the mortar used in the foundations of S. Clement Danes church, in London, was composed of two hundred of good lime, two loads of screened rubbish, and one load of new sand. The base of the obelisk on the tower of the church of S. Vedast, Foster Lane, built by Sir C. Wren, 1697, was found to have been laid upon a thick mortar joint, in which were imbedded two courses of flat oyster shells, these together with the mortar were found uninjured about 1835; DAVY, *Foundations*, 1839.

Mortar has been stated to be of eight sorts, which distinction is still kept up, as described in LANGLEY, *London Prices*, etc., 8vo., Lond., 1750, p. 33, as follows: "1. Inside and outside mortar, made of lime and sand. 2. Terrace (TARRAS) mortar, made of lime and tarras. 3. BRICKDUST mortar, made of red stock brickdust and lime. 4. Bastard tarras, made of smith's forge ashes and lime. 5. PARGETTING mortar, made of lime and horsedung. 6. Furnace mortar, made of Woolwich loam or Windsor loam only. 7. PLASTER mortar, made of calcined alabaster. 8. Fine mortar, called PUTTY, for rubbed and gauged works, made of lime only. The first sort will be now transcribed for a knowledge of former work: the others are noticed in their places in this dictionary.

"Inside mortar is used for vaulting, foundations, partition and party walls, insides of fronts and other parts which are hid from the eye and not exposed to the weather. This kind of mortar is generally made with pit sand, which requires more or less of sand, as it abounds more or less with loamy particles; therefore when pit sand is of a loamy fat nature, to a load (viz. twenty-four heaped bushels) put a hundred of lime (twenty heaped bushels); but when it is clean sharp sand, as Thames sand, then to a load of sand put 1½ hundred of lime, which mix up together as the lime is slaked in small quantities. In the former case it is five of lime to six of sand, and in the latter 7½ to 6. Outside mortar for fronts, tiling, etc., exposed to the weather, should be made with the sharpest grit sand that can be had, as being best able to withstand the insults of rains, etc. The proportion is two heaped bushels of unslacked lime to one of sand (p. 37). In countries where strong stone lime is used, the quantity of sand may be increased at the discretion of the workman, according to the strength of the lime" (p. 126).

The directions given for making good mortar about one hundred and fifty years since, are as follows: "Well burnt good lime and sharp sand; if very sharp, a load of sand (about thirty-six bushels) to a hundred of lime (being twenty-five bushels or a hundred pecks), to wit, to one bushel of quick lime a bushel and a half of sand. But if the sand be not very sharp, then you may put a greater quantity of sand, for mortar which hath its due proportion of sand, is stronger than that which has less sand in it; although some think otherwise. When you slack the lime take care to wet it everywhere a little, but do not over wet it, and cover with sand every laying, or bed of lime, being about a bushel at a time as you slack it up, that so the steam or spirit of the lime may be kept in and not flee away, but mix itself with the sand, which will make the mortar much stronger than if you slack all your lime first, and throw on your sand altogether at last, as some do. Beat all your mortar with a BEATER three or four times over before you use it, for thereby you break all the knots of lime that go through the sieve, and incorporate the lime and sand well

together, and the air which the beater forces into the mortar at each stroke conduces very much to the strength thereof. To build well, or use strong mortar for repairs, beat the mortar well and let it lie two or three days, and then beat it well again when it is to be used. The bricks should be dipped in a pail of water, or water thrown on the walls after the bricks are laid, as done at the building of Physicians' college, in Warwick Lane, by order of the surveyor, Mr. Hooke"; MOXON, *Mechanick Exercises*, 4to., Lond., 1700, pp. 20-1.

"Where sea coal ashes, clean from wood ashes and dirt, can be had they are preferable to drift sand, provided that the mortar be well beaten and used as bastard tarras. To two heaped bushels of unslacked lime, put one heaped bushel of drift sand or sea coal ashes, which beat well and work up hot as 'tis made ready for use." LANGLEY, *London Prices*, etc., 8vo., Lond., 1750, p. 326. 1. 2.

The recipe given by DINSDALE, in *CIVIL ENGINEER*, etc., *Journal*, 1845, viii, 312, is

| | |
|---|---------|
| Dorking, Bath, or Durdham Down lime | 1 load. |
| Sharp river sand | 2 " |
| Native carbonate of barytes finely ground | 2 cwt. |

The barytes being sifted into the mortar *after* it is mixed, *i. e.*, in working it up: but with blue lias lime, half the barytes should be mixed and slaked with the lime and sand. He asserts that the barytes yields its carbonic acid to caustic lime, and becomes caustic itself, and wholly destroys sulphuric acid or soluble sulphuric salts. Sulphate of barytes being strictly insoluble and non-decomposable. He adds that every practical man knows that in one month he can observe the formation of sulphates of lime, alumina, magnesia, etc., all arising from the oxygenation of sulphur in the slaking process, and from the subsequent action of sulphuric acid on the various bases existing in strong limes.

HIGGINS states that the best proportions for mortar are 3 parts of fine sand, 4 of coarse sand, and 1 of quicklime, recently slaked, and as little water as possible. The lime should be free from carbonic acid, and in the state of fine powder; the sand free from clay; and the water pure, but if previously saturated with lime, the better. MORVEAU's proportion is 3 parts of fine sand, 3 of well baked bricks, 2 of slaked lime, and 2 of unslaked lime.

Clay mixed with chalk in the proportion of 5 to 1, and well burnt in heaps, and well ground in a mill, water being added when the compound is required for use, is found to be very hard after two months; *BUILDER Journal*, 1856, xiv, 523, 541; which work, v, 8, notes that in frosty weather it is well to add salt to mortar. Hot water has likewise been found useful at such a time.

It is stated in *BUILDING NEWS Journal*, 1870, xix, p. 84, from the *AMERICAN BUILDER*, that the best method of preparing mortar is to have three boxes, each fixed higher than the other: the lime being placed in the highest box and stirred with water, until about the consistency of cream. This is allowed to run through a screened opening into the middle box, and then as much unscreened sand thrown in and mixed up as deemed necessary for the mortar. This mixture is then run through a screened opening into the lowest box, and allowed to stand for twenty-four hours, when it is fit for use. When the upper boxes are empty, the refuse should be cleared out and the operation renewed.

From among the modern methods of proportioning the materials for, and the mixing of, mortar, the following are selected; lime whether in lump or ground is not always expressed.

One bushel of well-burnt unslaked lime made from Dorking or Merstham grey chalk or Halling lime to three bushels of clean Thames sand, and to be taken from the river between Fulham and London Bridge. The lime and sand to be mixed together during the suspension of slaking by wetting the lime and covering it with its due proportion of sand. The propor-

tion of each to be duly measured. It is then to be passed through a fine screen of not less than thirty-five wires at equal distances in breadth of every foot. It is then to be sufficiently beat or passed through a proper mill. The mortar to be made as it is used. The mortar for the front of the lock basin and wharf walls for nine inches in width, is to be composed of $2\frac{1}{2}$ bushels of sand to 1 bushel of lime as before described, and when it has passed through the mortar mill, it is to be mixed with one bushel of fresh cement, and must be properly mixed together before it is used for the front mortar. The mortar for grouting to be four bushels of sand to one bushel of lime. This was considered to obtain a very good result.

At the works of the Shadwell basin the bricks which were very hard, non-absorbent, and impervious to water, were set in mortar composed of $1\frac{1}{2}$ sand to 1 of lime, intermixed with two bushels of pozzolana to the cubic yard. It set gradually to an extreme degree of hardness, so much so, that after the second day it resisted all ordinary attempts to scratch it or to destroy its surface.

Mortar used at the Albert harbour, Greenock, R. B. Bell and D. Miller, engineers. "The mortar shall be composed of ground lime, sand, and ground mine dust, in the following measured proportions: 1 part ground lime, half-part ground mine dust, 1 part sand. The measuring of the materials in the proportions specified for the mortar shall be proceeded with at a stated hour each day, and no measuring of materials shall take place on any account without the presence of an inspector; otherwise, in any such case the contractor shall be bound to remove such meted material at once from the works on receiving notice from the inspector. The materials shall be filled into box measures at their respective heaps, and brought forward upon the mixing platform, and mixed in a dry state, and discharged upon the covered platform before the mortar mills. The dry mixture is then to be placed under the edge stones and mixed with water for not less than fifteen minutes for each delivery, and shall then be immediately sent down in boxes for the use of the works. No more lime must be mixed than can be used up in one day; any mortar mixed on a previous day must be removed from the works at the inspector's orders." In DONALDSON and GLEN, *Specifications*, 8vo., Lond., 1859, will be found numerous examples of directions for the preparation, etc., of mortar in works of bridges, warehouses, a granary, a church, and at the Royal Exchange and Houses of Parliament.

Good lime mortar can be composed of slaked Scotch lime shells, clean sharp sand, and pure water, all properly mixed in the proportion of two measures of sand to one of lime, to lie in that state for four weeks, and to be beaten twice over with a baton before being used, as described in a Scotch (*Elgin*) specification.

"Regarding the lime simply as a cement uniting the particles of sand, the proper proportions of the two would appear to be those in which the lime is sufficient to fill up the voids between the particles of sand; this quantity may be readily ascertained by filling any measure, first with the sand, and then pouring into it as much water as will fill up the voids; by which means the bulk of lime required for the same purpose will be known. Mortar made with the proportions thus determined has been found to give very satisfactory results": MAHAN, *Elementary Course*, 4to., Edin., 1845, p. 11.

Experiments on strengths of mortar were made, April 1833, by joining three bricks on the beds, allowing them to dry for four months, and then breaking them by weights.

| | | | |
|----------------|----------------------|-------------------------|----------|
| $2\frac{1}{2}$ | bushels of sand to 1 | slaked lime, broke with | 105 lbs. |
| 3 | " " 1 | " " " | 134 " |
| $3\frac{1}{2}$ | " " 1 | " " " | 100 " |
| 4 | " " 1 | " " " | 112 " |
| $4\frac{1}{2}$ | " " 1 | " " " | 80 " |
| 5 | " " 1 | " " " | 67 " |
| $5\frac{1}{2}$ | " " 1 | " " " | 85 " |
| 6 | " " 1 | " " " | 79 " |

Thus, the general opinion that three of sand to one of *slaked lime* is the strongest proportion, appears to be supported; but it must not be taken for granted. A certain great authority has stated that "if the particles of sand were only made to adhere by a mere wash of lime, it would be sufficiently strong." The above experiments show that the notion was altogether erroneous. It will require much care to enforce the adoption of that proportion of three to one, and can scarcely be carried into execution without a pugmill. The hardest stone quick lime, on being slaked, will expand to double its size, and slaked lime, when well wetted, shrinks back into bushel for bushel, gaining only the interstices: sand thoroughly wetted lost about one-fifth of its depth." Lieut. NELSON, in *Corps of Royal Engineers, Papers*, 4to., Lond., 1840, iv, pp. 162-4.

Some other experiments made by Mr. G. Aitchison on the strength of small cubes of mortar, are recorded in the *BUILDER NEWS Journal*, 1871, xxi, 5:—

| | |
|-----------------------------|---------|
| 1 of lime to 2 of sand bore | 63 lbs. |
| " 3 " | 106 " |
| " 4 " | 106 " |
| " 5 " | 61 " |
| " 6 " | 34 " |

ARENATIO; ASHES; BEDDING TIMBER; BRICK, p. 145; BRICK DUST MORTAR; CALCAREOUS CEMENT; CEMENT; CLAY; GROUT; HAIR; HYDRAULIC MORTAR; INTRITA; LIAS; LIME; LIMESTONE; LIMEWATER; LOAM; MALTHA; PLASTER; SET; SLAKING; STUCCO; POZZUOLANA; TARRAS; etc.

WESTMACOTT'S prepared patent carbonate, and Scott's patent SELENITIC MORTAR, will be noticed under the references, and s.o. PLASTER.

Besides the publications mentioned herein and in CEMENT, the following may be useful. *Essays on Hydraulic and Common Mortars and on Lime Burning*, from the French of Treussart, Petot, and Courtois; with observations and experiments made at Fort Adams, Newport Harbour, transl. by TOTTEN for the FRANKLIN JOURNAL, 8vo., New York, 1842; and partly reprinted in CIVIL ENGINEER, etc., JOURNAL, 1838, i, 250. ARAGO, *On Limes, Mortars, and Cements*, a report to the chamber of deputies on M. Vicat's labours, same journal, 1846, ix, pp. 33-7. WRIGHT, *A brief practical treatise on Mortars—with an account of the processes employed at the public works in Boston harbour*, 12mo., Boston, 1845. C. H. SMITH, *Something about a Hod of Mortar*, BUILDER JOURNAL, 1865, xxiii, pp. 22, 40. BURNELL, *Limes, Cements, and Mortars*, 12mo., Lond., 1850.

MORTAR is coloured black, by adding to the sand as much black sand from a smith's moulding shop as will suffice for the purpose; this also makes a good mortar: also ashes and scales from a smith's forge: or six pounds of lamp black to about seven or eight hods of the stuff, and one part of smith's ashes to be very well incorporated. Soot must never be used, as it will spoil everything with which it comes in contact. Black oxide of manganese is best, it making a lasting colour; only a small quantity of it is required. The mixture of coal ashes with lime to darken it, has been found injurious to sandstone, causing it to decay from the edges inwards; sand from a foundry did not cause a like injury. BUILDER JOURNAL, 1865, xiii, p. 10.

MORTAR JOINT AND BED. The plane of junction, upright, horizontal, or inclined, of the materials used in the courses of masonry and brickwork. There are advocates for both thin and thick joints and beds. The question was lately discussed by three writers in the BUILDER JOURNAL, 1870, p. 89. Some architects consider that the mortar should not be stiff, but sufficient to run between the joints, filling up all the interstices, the bricks being wetted previously, making a perfectly solid wall. Others desire wet bricks and stiff mortar, and condemn grouting. Pointing, or recessed joints, being another subject as to the appearance of the work.

The ancients sometimes placed lead in the beds; and the mediævalists and moderns in the beds of columns. Gold bands have also been noticed, as in the temple of Diana at Ephesus: and copper is mentioned in the following extract:

"No yet language picked for the nones,
To tell the sotyll joynynge of the stones,
Nor howe they put in stede of mortore,
In the joyntoures coper gylte full dire.
To make them joyne by leuell and by lyne,
Amongst the marbell freshely for to shyne,
Agaynst the sonne whan his shene lyght,
Smote on the golde that was burned bright."

LYDGATE, *Troie*, cir. 1430, edit. 1655, B. 2, Sig. Fy, col. 2.

The Romans with their tiles used beds of mortar of almost an equal thickness—1 in., 1½ in., or 2 in. thick. In Spain, in many of the Moorish works, as at Toledo 1357, the bricks used are 11 in. by 7½ in., and 1½ in. thick, and the mortar joint is usually as much as 1½ in. thick. At Medina del Campo, the bricks are 12 in. by 8 in., and 1½ in. thick, and the mortar joints vary from 1½ in. to 1 in. At the beginning of the 16th cent. in the churches at Tarazona, the bricks are 12½ in. by 6½ in., and 1½ in. to 1¾ in. thick, the mortar joints being as usual generally about ¾ in. thick; at Zaragoza the bricks are 13½ in. by 6½ in., with ¾ in. joints; and at Valladolid, Toulouse, and Lubeck, 11 in. by 7 in., and 1½ in. thick, having 1 in. joints; STREET, *Gothic Arch.*, pp. 76, 351, 372, etc. Mortar as thick as the courses of brick was used in the early buildings at Cairo; HAY, *Cairo*, p. 4. In the East generally, as at Constantinople, and also in Italy, this class of work exists in ancient buildings as in those most modern. Where the mortar is good, such works are sound after centuries of wear, neither the action of the elements nor the violence of man having wholly destroyed them.

VIOLETT LE DUC, *Diet. Rais.*, Art. *Joint*, notices that the joints in mediæval work were very thick until the eleventh century, when they became very thin. In Auvergne and some other provinces, in the eleventh and twelfth centuries, the joints were finished square, and projecting somewhat before the face of the stones; while towards the end of the eleventh century they were finished convex and within the face, as at



Toulouse and elsewhere, probably by the same process as explained in BRICKWORK, beds, and joints, p. 147, and

shown in woodcut d. He gives an illustration from Strasbourg, of an unusual precaution, of cutting a groove around the upright joint to prevent water flowing to the mortar. At the end of the eleventh century the works at Canterbury, at Lincoln, at Rochester (as fig.), and at the Tower in London show joints at least two fingers wide. The joints of mortar in the thirteenth century are of about the same width as those of the twelfth, but the edges were grooved with an iron tool, so that they are slightly hollow instead of projecting—hence the manner in which the joints are finished is a safe guide to the dates of the different parts of the original work, especially as in modern restorations no care is bestowed on this matter, and they are all mixed together in a very intricate manner; PARKER, *Church at Caen*, read at the Royal Institute of British Architects, 1865-66, p. 91.

Ashlar masonry should have thin beds and joints to prevent unequal settlements. The best class of brickwork and terra cotta should also have thin joints, the thick joint being fatal to the neat finish of the work. But this is a completely disputed point, as some think there is no doubt that the attempt

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to get firm joints is one of the chief causes of fractures in modern stone work: the pillars of the Holborn viaduct being notable examples. In modern practice, in all masonry and brickwork where strength rather than ornament is studied, thick beds and joints of good mortar will be useful. "Thin bricks or tiles will also be better than thick bricks, as the material will be better burned, and consequently more enduring; more mortar can also be used, which in such work gives strength. Thick beds and joints may be used with advantage in masonry for docks, railway bridges, viaducts, and retaining walls, warehouses, goods stations, cotton mills, tall chimneys, fence walls, and all similar structures. Reservoir walls, tank walls, and covering arches for waterworks ought most certainly to have thick beds"; RAWLINSON (See BRICKWORK, p. 147), who states that the proportion of mortar to rubble stonework should be about 1 to 3; in ordinary brickwork 1 to 4; and thin bricks or very small stones 1 to 1. MOXON, *Mechanick Exercises*, 4to., Lond., 1700, p. 40, notices that four courses of brickwork should be worked in 11 in. See BASTARD TUCK POINTING. JOINT, and the references therein. JOINTER. POINTING.

VITRUVIUS, vii, 1, describing the laying of the tesserae in pavements with a fall of two inches in ten feet, states that in order that the mortar at the joints may not suffer by the frost, at the approach of winter every year it should be saturated with the dregs of oil.

MORTAR MILL. A metal pan, round which works a pair of vertical rollers, for crushing and mixing the materials. Sometimes the pan is made to revolve and the wheels only work round vertically on an axle, being turned by the pan; these are easier fed, and without the danger caused by the wheels revolving. They are of course worked by horse or steam power; single stones by hand. The pans run from 4 ft. to 12 ft. diam., as commonly advertised; about 5 ft. 6 in. is usual. Mortar was formerly mixed in a pug-mill, similar to that used in brickmaking. A mortar-making machine worked by a horse, as used in Paris, is engraved in the ALLGEMEINE BAUZEITUNG, 1843, pl. 570-1. The mortar-tempering machine is a simpler apparatus to save labour.

MORTICE and MORTISE (Lat. *carchesium*, but see; Fr. *mortaise*; Ger. *zapfenfuge*), written "mortes", temp. Henry VII (HUNT, *Tudor Arch.*, 94); "mortess" in 1632 (JUPP, *Carpenter's Co.*, p. 296); "mortess and tennant" 1700 (MOXON *Mechanick Exercises*, Joinery, 1678, p. 80). The square perforation made in the style or vertical piece in framing, to receive the tenon or thin projecting portion of the rail or horizontal piece. To secure the framing, holes are bored through both, and a pin, called a DRAW BORE PIN, driven through each, which brings up the haunch of the tenon home to the mortise. The strength of the sides of a mortise must be equalised to the tenon; the shorter the stuff of which the tenon is made, the less violence the tenon is subjected to; and it is easier to split wood with the grain than to break wood across the grain, and therefore the same wood when formed into a tenon is stronger than the same wood of the same size when placed as a mortise. The injury a mortise is subject to is splitting with the grain of the wood, which without good care it will often do in working; but the force that will injure a tenon must be applied across the grain, in which position it will stand most violence. In stuff 4 in. thick, the tenon is made an inch wide, so that the sides or cheek of the mortise hole are each 1½ in. thick. ROBISON, in the *Encyc. Britannica*, Art. Carpentry, mentions an ingenious modification of this joint under the name of FOX-TAIL WEDGING.

The term is also applied in the framing of timbers, as in a floor. The mortise is cut into the beam, and the tenon passes into it or through it and is confined in the mortise by a wooden pin driven into an auger hole made through the tenon. This injury to the timbers can be prevented by double spiking a batten to the side of the beam to carry each joint; it must

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not bend, and then is very strong. The same process is also adopted to connect an upright with the beam or cill into which it may be stepped, the pin then passing through both the mortise and the tenon. The bottom of a principal rafter was formerly secured into its tie beam in a similar manner, but it is now generally secured by a strap or bolt. Double tenon and mortise joints are very frequently used, but they present no superiority over the simpler joint, and are of more difficult workmanship. Illustrations to form this joint are given in most works on Carpentry, and in *ARCHITECT Journal*, 1849, i, 59; 70. CLAMP. CHASE MORTISE. BUTMENT. PULLEY MORTISE.

Mortising and tenoning machines, and chisels, are described in INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, xvii, 34; one by FURNESS, CIVIL ENGINEER, etc. *Journal*, xii, 351; ILLUSTRATED LONDON NEWS, 22nd March, 1851, p. 224; BUILDER *Journal*, 1849, vii, 502; and PRACTICAL MECHANICS' *Journal*, i, 16, iii, 21. Prof. WILLIS, in his *Lecture* at the Society of Arts, 28th January 1852, states that the self-acting mortising machine is distinctly described in General Bentham's specification of 1793 so completely as to entitle him to full credit for the invention of mortising machines. Gerish's machine for mortising and drilling is not now in general use. The Douglas machine was described at Royal Scottish Society of Arts, 26th November 1849, and is printed in CIVIL ENGINEER, etc. *Journal*, 1850, xiii, 22.

MORTISE BOLT. Patented 1864 by Jackson, Rollason, and Co., of Bordesley, Birmingham. This is a lock in the shape of a barrel inserted in the usual lock rail, and answers all the purposes of the larger lock without injuring the door so much.

MORTISE LOCK. A LOCK inserted in a mortise made in the lock rail of a door. It took the place of the brass rim lock of the sixteenth, seventeenth and eighteenth centuries, which was secured on the face of the door. Mortise and rim lock furniture is now made of all sorts, self-adjusting and otherwise. A cylindrical lock called a "mortise lock" was patented by Gerish, being a lock confined in a barrel, ending in a square shoulder, so that an auger of $\frac{3}{4}$ in. diameter could cut the mortise 6 in. deep required for a lock sufficient for a room door. An illustration of it is given in the CIVIL ENGINEER, etc. *Journal*, 1842, v, 204.

MORTISE LOCK BIT, see BIT.

MORTON, at Bristol, see NORTON (MASTER).

MORTUARY CHAPEL, see FUNERAL CHAPEL.

MORTUARY HOUSE. A place for depositing the body of a dead person before burial, after removal from the room or house in which death took place; or in which to place for recognition a body found dead. Probably the oldest known is the torre del Guardamorto at Florence, destroyed 1248, where the corpses to be buried in S. Giovanni were kept for a certain number of hours: VASARI, *Flor. edit.*, s.e. N. Pisano, i, p. 266. CEMETERY BEACON chapels were most common in Poitou, many existed in Auvergne, some in the département de l'Indre, la Sarthe, etc. They are called *lanterne des morts*, *colonne creuse*, *fanal de cimetière*. All those known are of the twelfth and thirteenth centuries, perhaps none earlier. The *lanternes* are generally small round, square, or polygonal turrets finished with a conical cap, on a basement; others are placed on a chapel like that dedicated to S. Catherine at Fontevault 1217-25; *Archæologia*, xxxiv, 285; and GAILLEBAUD, *Monuments*, etc., 4to., Paris, 1850, iii. The twelfth century "octagone de Montmorillon" has a crypt or undercroft chapel, bell gable, and octagon roof, the top destroyed; *idem*. The mortuary chapel at J. n. n. is given in NODIER and TAYLOR, *Champagne*, fol., Paris, 1843-5, in 3 plates. The circular chapel of S. John the Baptist 1374 in the Friedhof or cemetery at Nuremberg has a chancel and altar; WEBB, *Ecclesiology*, 111. One at Vienne is given in DALY, *Revue Générale*, xiv, pl. 40. The mortuary chapel of the Holzschüler family has a seat round a

circular nave, with stalls and an altar in the chancel. The transepts in some of the churches in Scotland formed mortuary chapels; MUIR, *Churches of Scotland*, 12. An example in Cappadocia, in the Armenian style, is illustrated in TEXIER, *Asie Mineure*, fol., Paris, 1839-49, ii, 57. ECCLESIOLOGIST *Journal*, Cemetery and cemetery chapels, 1845, iv, 9.

The morgue at Paris is a receptacle for the bodies of victims of accidents, of murder, or of self-destruction. It was established in 1804. The bodies are placed upon slabs of black marble in a sloping position, and are seen through a glass frame work. In 1815, four hundred and thirty bodies at least were deposited in it; PUGIN and HEATH, *Paris*, 4to., Lond., 1830, i, pl. 57. The *Leichenhaus* at Munich contains three large rooms, one for males and another for females, in which the dead are laid in the coffins for forty-eight hours before burial; the other room is for suicides and unowned bodies.

Notices of mortuary candlesticks will be found in WEBB, *Ecclesiology*, 8vo., Lond., 1848.

Dr. William Hardwicke, in a paper read before the British Medical Association at Oxford, in August 1868; and again 18th December 1869, before the Royal Institute of British Architects, with a design for one, advocated the erection of mortuary houses, and offered many suggestions for the designers of such buildings. The mortuary for S. Marylebone parish, erected 1868, is 30 ft. long, 20 ft. wide, and 17 ft. high, with brick walls cemented, York stone floor, and iron roof slated, the centre part filled in with rough glass. Air is admitted by trenches in the floor covered by an iron grating, and there is an opening at least 3 ins. wide all round under the eaves of the roof, protected by a projecting frame glazed with rough glass, kept so high as to admit of a very free escape of any impure air. The *post mortem* house is of iron, well lighted and ventilated, lined internally with match boarding varnished, and fitted with a table, good water supply, and other necessities. BUILDING NEWS *Journal*, 1868, xv, 567; xvi, 152. The mortuary erected 1872 for the City of London is capable of containing twelve bodies, a room for *post mortem* examination, a disinfecting room, store room, surgeon's room, and a small residence for a keeper. The cost was about £4500, exclusive of the site, which cost about £5000. The parish of Clerkenwell, one erected in 1866; S. Pancras in 1868; S. Mary Islington in 1874 at a cost of £650; and other parishes have followed. A design for such a building, to contain a mortuary, inquest room, coroner's and witnesses' rooms, by P. E. Masey, is given in BUILDER *Journal*, 1867, xxv, 424. A mortuary is attached to the City of London lunatic asylum near Dartford, Kent, with dissecting room, etc., Every such asylum should have a mortuary house.

MORUNG SAUL. A timber of Asia, of the first class; see SHOREA.

MORVO (JOHN), see MURDO (J.)

MOSAIC GOLD, see BRASS.

MOSAIC or more correctly MUSAIC WORK (Lat. *opus musicum*, glass mosaic; *opus tessellatum*, clay mosaic; *opus lithostrotum*, stone mosaic). The word mosaic, in its extended sense, may be employed to designate every combination of minute portions of any material, which can, by the connection of parts, regular or irregular, be so arranged as to convey a feeling of unity, or of variety of design; the expression thus understood, is susceptible of a very extensive application, and may especially be rendered subservient to the various purposes of architectural and artistic decoration. In a less extensive sense, the art of working in mosaic is limited to the employment and arrangement of stones, marbles, and vitrified substances. The ancient art of mosaic may be stated to have been practised down to the period of Constantine the Great (320); the medieval, from the general adoption of Christian worship to the revival of classical learning in the fifteenth century; and the modern, to include all the varieties of incrustation from the days of Raphael and Michael Angelo to the present time.

The ancient Egyptians probably employed mosaic work; there is in the Egyptian collection at Turin a fragment of a mummy case, having the paintings executed in enamel with colours of different hues; it is believed to be the only example known. Incrusted flooring in Persia is recognised in the words in the book of ESTHER, i, 6; it was probably imported into Greece, but scarcely any specimens of pure Greek art have descended intact. The first authentic account of the appearance of *opus musivum* in Rome is that given in PLINY, who states Sylla to have been the first Roman who caused to be produced specimens of *opus lithostrotum* (literally, stone-laid work), thus dating about B.C. 80: he also restored the celebrated Roman mosaic in the temple of Fortune, found at Palestrina in 1640. Following CIAMPINI, Roman mosaic work is divided into four classes:

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| I. Tessellatum | } applied to pavements generally; and mentioned in VIRGIL. |
| II. Sectile | |
| III. Figlinum | } usually applied to walls and vaults. |
| IV. Vermiculatum | |

The first of these is probably the most ancient. It consisted of small cubes of marble averaging about three-quarters of an inch square, to compose a geometric figure: these cubes were called *tesserae*. The best examples occur at Pompeii, etc., and many fine specimens have been found in this country. The second was formed of *crusta* or slices of marble, not imitating the forms of actual subjects, but producing a pleasing effect, though the shape, colour, and vein of the different slabs of marble opposed and contrasted. This species may have been introduced about B.C. 50; the most noble specimen of it now extant is the pavement of the Pantheon at Rome. The third was probably produced by the desire for a more extended scale of shades and colours than was used in the first sort. This work is now called *lavoro di smalto*, and is mosaic composed of minute portions of a compound of silex and alumina, coloured by the addition of a metallic oxide, but possessed of a much larger proportion of the former material than now in use by the modern Italians. As it could be easily reduced to any given form, obtained of any variety of colour, as it was far less costly than marbles, and as it was possible to cover it with un tarnishable gilding, it resulted that this work advanced into almost universal popularity. The fourth class is composed of the third in conjunction with small fragments of marble and even of gems. This class was limited to the direct imitation of figures, ornaments, pictures, and such like works. It has been divided into three varieties, applicable rather to scale than to any fundamental difference. These are:

- a. The major, applying to vaults, sometimes to pavements.
- b. The medium, to walls generally.
- c. The minor, to pictures and portable ornaments.

Most of the fragments of mosaic found in England are of the first variety. The stones composing the forms are not always of a regular shape; a great part of the flat tints is filled in with regular square *tesserae*, thus forming a mixture of *opera tessellata* and *vermiculata*. The medium sort was appropriated to representing flowers, figures, and festoons; the celebrated great mosaic of Pompeii is of this class. The third was reserved for the most delicate pictures, of which the finest specimen is that found in Hadrian's villa, and called Pliny's Doves, now in the museum of the Capitol at Rome. The surface of this work was most highly polished; the medium less brilliantly, and the *majus* only so far rubbed down as to prevent any inequality of surface.

Besides these there were two other divisions:—1. The *opus incertum*, composed of all sorts and kinds of marble put together in irregular shapes, and when united into a mass with cement and laid down was reduced to a polished face by friction. In mode of execution it is almost precisely similar to the Venetian *pisé* floor and the common Italian *trazzo* of the present day. The second mode was that of applying the coloured cubes of marble, *ficilia*, and some other

substances to surfaces in relief, by covering a rude *mezzo rilievo* with plaster, and then cutting away portions of the surface, and replacing the parts so removed with delicate tessellation. Mr. (now Sir) Digby Wyatt describes the cement in which the mosaics were fixed.

The most ancient mosaic that has been discovered displaying Christian workmanship is probably the one found at Horkstow in Lincolnshire; it is supposed to be earlier than the time of Constantine the Great. During the *medieval* or Christian period, there arose between A.D. 330 and the fourteenth century three varieties, which obtained universally in Italy. These consisted of

1. Glass mosaic, called generally *Opus musivum*, imitative; used for walls and vaults.
2. Glass tessellation, called generally *Opus Græcanicum*, conventional; generally inlaid in church furniture.
3. Marble tessellation, called indifferently *Græcanicum* and *Alexandrinum*, conventional; formed into pavements.

The pieces of glass employed in the formation of the first class are of irregular shapes and sizes, of all colours and tones, the ground tint almost invariably prevailing being gold. It is always large and coarse. Lord Lindsay considers that this work in Italy remained as late as the twelfth and thirteenth centuries the exclusive monopoly of Byzantium; the Latins only learning the *opus Græcanicum*, and the finer incrustation for the ciboria and reading desks. With Gaddo Gaddi the genuine art of Italian glass mosaic may be said to have died out. The second class consisted in the insertion into grooves cut in white marble, to a depth of about half an inch, of small cubes of variously coloured and gilded *smalti*, and in the arrangement of these simple forms in such *geometrical combination* as to compose the most elaborate patterns. These ornamental bands it was customary to combine with large slabs of valuable marbles. Probably the earliest example is in the basilica of S. Lorenzo at Rome, dating about 580. The third class formed the ordinary Italian church paving from the time of Constantine down to the thirteenth century. It is an arrangement of small cubes, usually of porphyry or serpentine, composing geometrical patterns in grooves cut in the white marble slabs which form the pavement. They are not fitted together with any neatness. It was gradually superseded by that kind of work known to the Italians as *opera di Commesso*, mosaic formed by slices of marble, the projections of one piece being so cut as to enter the recesses of another: and also known as Florentine mosaic. Another sort was limited to those districts where the materials were to be obtained, namely volcanic mosaic, which was inserted in the surfaces of stone or marble of a lighter or warmer colour. MONREALE.

Mosaic work obtained at Agra and Delhi (*cir.* 1650) in the form of inlaying with precious stones, marbles, and coloured compositions: in Turkey and Asia Minor, in the form of large pieces of *faience* coloured on the surface and fitted together: in Spain, in the *azulejos* or painted tiles used in dadoes, etc.; only one instance occurs in the ALHAMBRA (1330-90) of mosaic used as a pavement.

Modern Roman glass mosaic is an imitation of the *opus figlinum*; modern Florentine, or *Pietra dura* work, that of *opus sectile*. The former arose mainly by the ability of G. B. Callandra, who died 1644, and the manufacture has remained the same. The Florentine is generally composed of an assemblage of precious materials in very thin slices or veneers, and fitted to represent fruit, flowers, etc. This work is called by Italians *opera di Commesso*. It is now imitated in various marbles at works in Derbyshire.

During the last few years in England, various manufacturers endeavoured to revive the lost process. Early in this century Mr. C. Wyatt obtained a patent for inlaying stone with coloured cements. Terra cotta inlaid with coloured cements has been tried, with variations. Mr. Blashfield in 1839 constructed a pavement for Mr. Hope at Deepdene, combining the principles

of the opus incertum, the Venetian pisé, and the Italian trazzo, floors; by colouring cements and bitumen with the metallic oxides. Mr. Singer placed compact and well pugged clay in a machine, where by powerful levers it was subjected to great pressure, then dried, cut, and fired. The pavement of the hall of the Reform Club, and a portion of that at Wilton church are examples. In 1840 Mr. Prosser of Birmingham found that if the material of porcelain be reduced to a dry powder and subjected to strong pressure between steel dies, it is compressed into about a fourth of its former bulk, thus possessing extraordinary hardness and density, and being less porous than common porcelain. The cubes are placed on a level bench to the pattern required, and covered with a cement in which is bedded tiles or slate as a backing; when set, the whole is lifted off and removed to its intended situation. This process for making tesserae was carried out by Mr. Minton, with Mr. Blashfield, and Messrs. Wyatt, Parker and Co.; since which time the manufacture has been greatly developed by them and by Messrs. Maw and Co.

The above description of mosaic work has been condensed (and partly added to) from twenty-one pages on the subject in WYATT, *Specimens of the Geometrical Mosaic of the Middle Ages*, fol., Lond., 1848; who refers to the works of VITRUVIUS; MÜLLER, *Archæologie der Kunst*, 2nd edit., 8vo., Breslau, 1835; SECCHI, *Mosaico Antoniano*, 4to., Rome, 1843; FURIETTI, *De Musivis*, 4to., Rome, 1752; BALDINUCCI, *Notizie*; CIAMPINI, *Vetera monumenta*, etc., fol., Rome, 1747; PLINY, and other early writers; the translation by HENDRIE, 8vo., Lond., 1847, of THEOPHILUS, *Schedula Diversarum Artium* (early half of 11th cent.); GUTENSOHN and KNAPP, *Basiliken Christlichen Roms*, fol., Stuttgart, 1822-7; HOPF, *History of Architecture*, 8vo., Lond., 1835; LINDSAY, *Sketches*, 8vo., Lond., 1847; MALLAY, *Eglises Romanes, etc., du Pays de Dom*, fol., Moulins, 1838; and WARD, *On Mosaic, etc., pavements*, with designs by O. Jones, 4to., Lond., 1840.

The superiority of Sicilian mosaicists is admitted from the fourth century; SYMMACHUS, Ep. viii, 4, asks from Antiochus of Sicily for patterns for a new kind of mosaic to apply at Rome; BATISSIER, 374. HESSEMER, *Arabische und Alt Italienische Bauverzierung*, fol., Berlin, 1842, gives an example among others from a pavement in the baptistery at Pisa (begun 1153), the compartments of which form precisely the same pattern as that of the window in the mosque of Hakim at Cairo. A peculiar sort of mosaic is to be seen in the renaissance churches of Palermo, which is gorgeous beyond description as a wall lining. It has a flat marble slab as a basis, and in this are inlaid mosaic flowers, etc., in varied colours raised, in fact sculptured as ordinary ornamental alto-relievo, but in natural coloured marbles.

In the vault of the apse in the little church of Germigny des Prés (Loiret), dating in the ninth century, is a mosaic of the Greco-Byzantine style which VIOLLET-LE-DUC, *Dict.*, s.v. Mosaïque and Stuc, notices as the only one of the sort in France.

Among the most beautiful mosaics preserved in the pavements or walls of ancient buildings are: the one in the Capitol at Rome, found in a chamber in Hadrian's villa near Tivoli, and called Pliny's doves; that at Palestrina, the ancient Pre-neste, the first Roman mosaic; the one in the villa Albani representing a school of philosophers, and another depicting the history of Hesione, daughter of Priam; from Pompeii, that of three masked figures playing on instruments, on which the name of Dioscorides of Samos was engraved, and the most interesting and valuable of all ancient mosaics, the one found in the house of Pansa, supposed to represent the battle of Issus; cuts of the two last are given in WESTROPP, *Travellers' Art Companion*, 8vo., Lond., 1868. At Carthage; the island of Sardinia (now in museum of Turin); Vienne; Rheims; Lyons, representing the Circensian games; London, and many parts of Great Britain, fine examples have been found. The

grand specimens of inlaying of Italian works at Siena are not usually referred to; they are the works of Ducia della Buonini, of Seyna, and of Beccafumi.

In Russia, the modern malachite inlaid work is a sort of mosaic work of one material in small pieces producing a large whole. At S. Petersburg is a manufactory of mosaic, which has produced some remarkable works; it was founded by the government under the direction of Sig. Bonefede, of Rome, who died shortly before 1868.

Rust's enamelled mosaics were brought out about 1864, and are described in BUILDER *Journal*, xxii, 491; some of the full length figures in the principal hall at South Kensington museum are of these tesserae. Salviati's indestructible Venetian mosaic was introduced about 1862, when he executed for the Wolsey tomb house at Windsor Castle, those covering the roof measuring 2000 ft., and afterwards those on the walls; others in the mausoleum at Frogmore, and at the Albert memorial; also two spandrels under the dome of S. Paul's cathedral; BUILDER *Journal*, 1851, ix, 602, and 767; and the portraits of the great painters in the arcades of the South Kensington Museum. (MURANO.) The use of coloured opaque glass inlaid upon walls is (1871) carried out by Messrs. Powell of Whitefriars. Mr. Minton Campbell's process 1871 consists in painting the subject in oil colours on prepared clay; it is then broken up into groups, burnt in the furnace, and subsequently fixed in its place, perhaps never to perish, except by wilful means. For certain purposes, terra cotta instead of enamel tesserae are sufficiently effective, but they lack the richness, brilliancy, and luminous quality of enamel, while certain colours cannot be produced; the gold being external is liable to tarnish; and their durability is more than doubtful, as proved at S. Mark's at Venice. The manufacture of marble mosaic pavements (opus incertum) is now largely carried out in London.

It should be noticed that whatever may be the material put upon the walls, the walls themselves must be perfectly dry, and protected from any access of damp, or of intense cold sufficient to freeze the damp behind or on the mosaic work; without these precautions it will go to decay.

AGATE INLAID WORK; AMAASA; ALEXANDRINUM OPUS; COMMESSO; FLORENTINE MOSAIC; FLOOR (INLAID); GLASS, p. 44; HYALOSTROTUM OPUS; INLAID WORK; LITHOSTROTUM OPUS; LINING; GRECANICUM OPUS; VENETIAN MOSAIC.

Among the older publications on mosaic work are:—BARTHELEMY, *Explication de la mosaïque de Palestrina*, 4to., Paris, 1760; and also in the *Mémoires* of the Academy. SAVORELLI and CAPELLANI, *Opus Musicum erulum ex rudibus villæ Hadriani*. HOFFEELIN, *Observations sur la mosaïque des Anciens*, in *Comment. Histor. Academiae Theodoro Palatinæ*, v, No. 3, p. 89, 4to., Manheim, 1783. VISCONTI, *Osservazioni su due Musaici antiche istoriati*, 4to., Parma, 1788. DE VIELLE, *Essai sur la peinture en mosaïque*, a translation of Furietti's work above mentioned. PACIAUDI, *De sacris Romanorum balneis*, 4to., Rome, 1758. BUONARROTI, *Observations on the Glass of the Ancients*, 4to., Flor., 1716. PIACENZA, in BALDINUCCI, *Notizie dei professori*, 4to., Turin, 1768, i. FOUGEROUX DE BONDAROV, *Traité sur la fabrique des mosaïques*, at end of his *Recherches sur les ruines d'Herculanum*, 8vo., Paris, 1770. CAYLUS, *Essai sur la manière de peindre en Marbre*, in *Mémoires* of the Academy of Inscriptions, xxix. GURLITT, *Ueber die Mosaik*, 4to., Magdeburg, 1798. KIRCHER, *Latium*, fol., Rome, 1669. MONTFAUCON, *L'Antiquité expliquée*, Suppl., fol., Lond., 1721-25, iv. LA BORDE, *Descr. d'un pavé mosaïque—à Italica*, fol., Paris, 1802.

The later works comprise:—AVELLINO, *Il mito di Tolo*, fol., Napoli, 1847. BENZIUS, *Explicatio Musivi Burghesiani*, 7 pl., fol., Rome, 1845. TOSSI, *Il Mosaico Antoniano*, 2 pl., 4to., Rome, 1843. VESCOVALI, *Discorso sul gran mosaico di Pompei*, fol., Rome, 1832. SCHMIDT, *Baudenkmale*, fol., Treves, 1845. UGGERI, *Della basilica di S. Paolo*, 4to., 1838. SAL-

ZENBERG, *Altchristliche Baudenkmale im Constantinople*, 4to., Berlin, 1854. WEBB, *Ecclesiology*, 8vo., Lond., 1848. *Reports on the Paris Universal Exhibition*, 1867, ii. A large series of plates published by the SOCIETÀ CALCOGRAFIA at Rome; those in MAZIOIS and GAU, *Pompeii*; FOWLER, numerous plates of mosaic pavements found in England; a paper on these, given in *BUILDER Journal*, 1862, xx, 564. ROSSI, *Mosaici Christiani e Saggi dei pavimenti delle Chiese di Roma*, fol., Rome, 1872. *Mosaic pavements*; stone cutting, etc., illustrative of the art, 50 pl., fol., 1765.

Jurors' Reports, Exhibition of Industry of all Nations, 1851, p. 567. WYATT, *Mosaic as decoration*, paper read at Royal Inst. of British Architects, 1862, reprinted in *BUILDER Journal*, xx, 199, 205, 218; also by A. H. LAYARD, *On Mosaic Decoration*, 23rd November, 1868; a lecture by NORTON, in *BUILDING NEWS Journal*, 1859, xvii, p. 150; and GAMBIER PARRY, in *Reports of the International Exhibition 1871*, reprinted in same *Journal*, 1871, xxi, p. 65. ARCHEOLOGICAL, *Early Mosaics*, xlii, 380; and paper by NESBITT, 1867, xl, 184-5; ARCHEOLOGICAL JOURNAL, vii, 347; JOURNAL OF ARCHEOLOGICAL ASSOCIATION, xiii, 215. DALY, *Revue Générale*, xiii, 50, etc.; xiv, 43, etc. GRUNER, *Ornamental Art*, pl. 36, 38, etc., at Pompeii. SCIENCE AND ART DEPARTMENT, SOUTH KENSINGTON, *A list of Buildings in England having marble and other painted decorations, of dates previous to the middle of the sixteenth century*, 8vo., Lond., 1872; and *Report on Mosaic pictures for Wall Decorations, and Notes of Objects in Italy suitable for reproduction by various methods*, 8vo., Lond., 1872. A series of drawings of ancient mosaics made by J. M. Lockyer, and presented to the Royal Institute of British Architects by Prof. Donaldson, Pres. A valuable series of drawings of Greek and Roman mosaics, to be found in Spain, France, Pompeii, Prussia, Switzerland, Rome and Italy generally, Constantine, Carthage, and also in various counties in England, was presented 1867 to the South Kensington Museum by the widow of Dr. Woollaston. W. C. THOMAS, *Mural Decoration*, 8vo., Lond. (1869), which gives a list of the works in mosaic still existing. *Illustrations*, Ceiling, 1849-50, part ii; Marble Pavement, 1861, 2 plates coloured; and Pavement (inlaid), 1848-49, part ii; and (tessellated) 1848-49, part i. 14 25.

MOSCATELLI (DORICILIO), called Bataglia, also an engineer, was born in 1660, and rebuilt the church of S. Barnaba dei Servi di Maria; completed 1726 the palazzo della Ragione as now seen; repaired the porto di Catena; and built the church di Governolo; all at Mantua. He died in 1739, aged 79, and was buried in the church of S. Andrea, his tomb has the inscription, MOSC. BAT. OSSA. CODDÈ, *Memorie di Mantovani*, 8vo., Mant., 1837, p. 114.

MOSKVA (Lat. Moscus; Fr. Moscou; Ger. Moskau; Eng. Moscow). The capital from 1490 of the Russian empire until it was supplanted by S. Petersburg. It is situated on the river Moskva, which is 342 ft. wide and about 7 ft. deep; the north bank, 27 ft. high, was lined with stone by Catherine II (1762-96); the south bank, 23 ft. high, was begun to be lined in 1833. It is crossed by four bridges; the timber one was rebuilt of stone 1687 (II pl. 41), rebuilt 1812 (II pl. 42), and rebuilt of iron 1859 (II pl. 43) at the west end of the *Kremlin*; there is one of timber at the east end, a suspension bridge, and another of stone. The city, which first became of importance in 1328 under Ivan I, was nearly all burnt 1547, destroyed in the last Tatar invasion of 1571; and suffered greatly in the fires of 24th May 1712, and of Sept. 1812; after which the cav. D. Gilardi of Montignola was entrusted with the superintendence of the rebuilding, he having erected many large edifices in Russia. F. Camporesi of Bologna was employed there before 1812.

The only two publications which give architectural representations of the buildings, are TH. RICHTER, *Monuments de l'Ancienne Architecture Russe*, fol. M. 1850-51 (in Russian); and V. KIPRIANOFF, *Hist. Pict. de l'Arch. en Russe*, 8vo., M.

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1864; the numbers (I) and (II) herein will refer to the buildings illustrated in them. The *ILLUSTRATED TIMES Newspaper*, 1856, iii, 166, 181-284; and the *ILLUSTRATED LONDON NEWS*, 1856, xxix, 246 to 410, both give a large number of exterior and interior views of the buildings on the occasion of the coronation of the present emperor. The mixture of languages in the names herein cannot be avoided.

Near the centre of the city on the north or left bank of the river is the *Kremlin* or palace fortress, surrounded by a white wall 60 ft. high, and about a mile in circuit. To the east of it is the *Kitay-gorod*, the Chinese or commercial quarter, the city proper, round which is a wall with twelve towers and five gates. The houses are built close together, contrary to the usual mode. Around the two parts as a centre with a radius of a mile is comprised the *Beli-gorod* or white town, which had a stone wall built 1586 by the architect Kononow, and removed cir. 1780. Beyond that, with a radius of 1½ miles, is the *Zemliany-gorod*, or earthen town, which crosses the river, and is so called from the rampart constructed 1591-2 (or 1618), which was formed into boulevards about 1800. Beyond this again are the *slobodi* or suburbs, etc., extending to a circuit of about 20 or 25½ Eng. miles, and crossing the river, and surrounded by a wall or earthen rampart with gates. The whole city is laid out irregularly, but the streets radiate somewhat to the centre.

In 1832 the city contained 287 churches, 5 cathedrals, 37 chapels, and 8 others, 21 monasteries, etc. About 1870, Moscow, with a population of under 400,000 (at the end of 1871 said to be 611,970 persons), contained 389 churches, of which 382 belong to the Greek rite, 2 to the Roman Catholic, and 2 to the Lutheran; also an Armenian, a Reformed, and an English Church. The 382 Russo-Greek churches include 7 cathedrals, of which one is now in course of erection, 21 monastic churches, 237 parish churches, 6 chapels attached to the palaces, 59 consecrated chapels in private mansions, 23 small public chapels, and 8 mortuary chapels. Three of the churches are dedicated to Alexis, 6 to Alexander, 7 to the Annunciation, 5 to the Purification, 12 to the Resurrection, 7 to the Ascension, 22 to the Trinity, etc., therefore without the addition of the names of the locality, it becomes difficult to identify them in the descriptions of Moscow. The style of architecture in all the old churches is nearly the same, and consists of a mixture of the Asiatic and Byzantine styles: RUSSIAN ARCHITECTURE.

The *Kremlin* is somewhat triangular in form. The walls are from 12 ft. to 16 ft. thick, and from 28 ft. to 50 ft. high, with battlements, etc.; their circumference is about 7,280 ft.; they are of brick and coloured white; they date from 1367, but were rebuilt about 1485-95 by John III, who employed Marco, with an assistant Pietro Aretino, among other artists obtained from Italy and Germany: (No. I) states "by the Friazines Peter, Antony, and Mark". It stands about 46 ft. above the banks of the river. Rising from the wall on the south side, which is about 2000 ft. long, are seven towers finished with spires; another at the west end is called *Boris* tower, FERGUSSON, fig. 916; there are four towers on the north-west side including those at the angles, the most ornamental is the *Troitz* or Trinity tower, said to have been built by Christopher Galloway, an English clockmaker, in the early part of the seventeenth century; it was restored 1759 and after the conflagration of 1812. Two large towers occur on the east side and a turret called the *Tsarskaya bashnya*; the *Spaskiya Vorotni* or gate of Our Saviour 1491, FERGUSSON, fig. 917, under which is a long sort of tunneled archway, was by Peter Solarius, a Milanese, the tower of which (Gothic) was built by C. Galloway in 1426, and with a small tower of the Tsars on the wall (Hindoo Turkish style) are shown (II pl. 46): the Nicholas gate is the last on this side, the tower 1491 by an Italian, has suffered from fourteen restorations: there are five gates altogether.

Within the walls of the *Kremlin* are 32 churches and 170 chapels, cupolas and towers, in fact, it contains by far the greater part of the public buildings, besides the palaces. The *Uspenski sobore*, the cathedral dedicated to the Assumption of the Mother of God, is the oldest and most interesting, "bursting with tombs and pictures" (STANLEY, *Eastern Church*). The foundations were laid 4th August 1326, but the building falling 1474, was rebuilt 1475-79 by Aristotile Fioravanti of Bologna, after the model of the cathedral at Vladimir; 1514 the inside was painted in fresco, 1550 roof gilt, 1626 the walls strengthened, 1644 interior repainted and again in 1711, 1684 the five domes covered with plates of copper gilt, and reinstated after the fires of 1737 and 1812; it still retains its original form, a square with four round pillars supporting a dome, and five deep recesses one having an apsidal end. The tzars are crowned in this building, which is 117 ft. long, 82 ft. wide, and 128 ft. 9 in. high to the top of the cupola; FERGUSON, fig. 912, states 74 ft. by 56 ft., perhaps inside dimensions. Two chapels in it were built 1328 and 1425 (II pl. 17). The *Archangelski sobore* or cathedral of S. Michael the Archangel was founded 1333—finished 1416; 1507 enlarged by Alevisio, and restored for Catherine II, and repaired 1770. The roof has five cupolas. The interior is 140 ft. long by 124 ft. wide and 112 ft. high; there are two chapels; the tzars, from the founder of the city to the predecessor of Peter the great are buried in it (II pl. 18). The church of the Lady of the Cave adjoins it. The *Blagoveschenski sobore*, the cathedral of the Annunciation, was founded 1397-1416, rebuilt 1487 for John III, and completed 1507 by Alevisio; and repaired 1770; the pavement is formed of jasper, agate and cornelian. There are four chapels in it; the roof has nine cupolas; it is the smallest of the group: the tzars are baptised and married in it (II pl. 19). Boress the Roman painted 1340 the cathedrals, and 1346 cast the first bells. The church of the Twelve Apostles was consecrated 1723. The church of the Saviour in the palace, is a copy of Sta. Sophia at Novogorod, which is a copy of that at Constantinople; the original church, the oldest in Moscow, was dedicated to the Transfiguration; 1330 was converted into a monastery, 1463 monks removed and made cathedral, perhaps rebuilt 1527, but 1817 was reduced to a parish church. The church of the *Vercho-spaski*, or of the Saviour behind the golden screen 1450, was built near the *salle Dorée* (partly in the Lombard style) in 1634-6 by the master mason Bazhenov Ogurtsov, and over it the church of the Crucifixion of the Saviour, 1679 (I pl. 8); and (II pl. 28) calls the upper building the church of the Resurrection; it appears to be erected on two churches: the roof has eleven domes; the cornice of it and the pedestals of the domes are decorated with faience, the colours of part of which are still as fresh as new. The church of the monastery of the Catacomb of the Mother of God (I pl. 21). S. Saviour's, adjoining the palace of the czar, having nine gilt cupolas, was erected in the eleventh century, and repaired 1733. The church of the Blessed Virgin (II pl. 21-2). There is a bronze door 997, and another more modern, to one of the above churches. The *Icanofskaya* or large belfry of Ivan Veliki (John the great), which is common to all the churches in the Kremlin, was erected 1600, rebuilt after 1812 (II pl. 27). It is of five stories, 241 ft. high, with a gilded dome, having a cross above a crescent on its summit of 18 ft. more (325 ft. total height, MURRAY), FERGUSON, fig. 915: in the lower part is a chapel to S. John of the Ladder, 1508 by Alevisio; the upper church just under the bells dates 1532; above it are thirty-four bells, the largest of which weighs 64 tons, 8 cwt., 14 lbs. = 4000 pounds (about 140,000 lbs.), recast after 1812; the most ancient of the other bells dates 1550. The celebrated great bell, *tzar Kolokol*, was placed 1836 on a pedestal at the foot of this tower; it was cast in 1733 and broken in 1737; its present weight is 10,000 pounds as inscribed = 350,000 Engl. lbs. (Montferand puts it at 12,000 pounds).

| Authority. | weight. | diam. | height. | metal | |
|----------------------|---|-------|---------|------------------|--------|
| | | | | circ. | thick. |
| A guide ... | 161-071 tons. | 22 8 | 20 7 | — | — |
| Ditto ... | Piece out is 7 ft. by 3 ft. wide. | 19 3 | 60 9 | 23 | — |
| Another ... | — | 22 5 | 21 3 | — | — |
| Coxe ... | 443,772 lbs. | — | 21 4 | 61 4 | 23 |
| Mayerberg { | 320,000 lbs. | 18 0 | 19 0 | 54 0 | 24 |
| | Tongue 14 ft. long. | | | | |
| Clarke ... | 443,772 lbs. | 22 5½ | — | 67 4 | 23 |
| | value £66,565 10s., at 3s. per pound. | | | | |
| Kilburger . | 396,880 lbs. or 170-718 tons with scoria, etc. | | | | |
| Murray ... | 440,000 lbs. | — | 19 3 | 60 9 | 24 |
| (Handbook) | the piece out weighing 700 pounds or about 11 tons. | | | | |
| De Monferrand, 1840 | — | 22 8 | 20 7 | — | — |
| Measurements, 1868-9 | | 21 8 | 17 0 | without top | — |
| | | | 26 4 | 67 11 | — |
| | | | | to top of cross. | |

NOTES AND QUERIES *Journal*, 1869, 4th ser., iii, 291.

The palace of the tzars occupies the site of one first built of timber by Jecht of Saxony for empress Anne (1730-40), which was superseded for a palace for the empress Catherine (1762-96). This was 630 ft. by 462 ft. of four floors in height, and enclosed five courts; it was designed 1774 by Rinaldi, and finished by Camporesi: the two Corinthian façades were by Guarini. A model, which cost 60,000 roubles, of a palace also designed for her by Bazhenov to be built between the Spasskoy and Troutsokoy gates, and the first stone of which was laid 1773, is in the armoury. The palace was pulled down to be rebuilt fireproof 1838-49, as at present (II pl. 42) by Alexander and Nicholas (CIVIL ENGINEER, etc., *Journal*, iv, 367; xii, 94, which does not name the architect), and is called *Bolshoi Dvoretz* or large palace; with the *Maloi Dvoretz* or little palace originally erected by Catherine, and presented by the Metropolitan Platon in 1817 to Nicholas. It contains numerous large magnificent state rooms, with several more interesting and ancient portions, as the *Zolotaya palata* or gold court; the red staircase; the *Granovoi palata*, or faceted palace, 1484 or 1491, a stone vaulted chamber resting on a central pillar (I pl. 20); and the *Terema*, or old palace (II pl. 21 and I pl. 23-33), devoted to the tzarevna and her children, of four floors, the two lower stories of which are magazines and were built 1487 or 1499 for John III by Alevisio (or by Marco and finished 1490 by Pietro Aretino), and the two upper added 1636 for Michael: the whole restored since 1836-49 (II pl. 21). Within the palace is a labyrinth of fourteen chapels, small and low, among which is the church of the Nativity of John the Baptist 1393 (I pl. 18). The *Oryje-inaya palata* or treasury forming the right wing built 1851, contains a vast collection of standards, robes, plate, thrones, crowns, and very many works of great intrinsic value and archaeological interest, especially of Byzantine and of late Greek work, very fully illustrated in a series of coloured engravings issued in five volumes at the expense of the Russian Government, of which copies were presented to the British Museum and the London Institution. The armoury and jewel office is built in a modern style having eight Corinthian columns; a staircase leads to the first floor 350 ft. long divided into five rooms. The *Potechny palata*, banqueting house, or pleasure palace, of various styles, erected under Alexis (1645-76) is since 1806 the commandant's residence (I pl. 9 and 10 from an ancient drawing). The *Chudof* or Miracle monastery, founded 1365, was rebuilt 1501 and 1679 with two churches; its church of S. Michael, built 1365, rebuilt 1504, and restored 1779, is the place of sepulture of the patriarchs; the house of the Holy Synod contains most interesting relics of antiquity and arts; the monastery of the Ascension within the Holy Gate, founded 1387-8, rebuilt 1393 and 1721; the old church 1407, and a new one erected at beginning of nineteenth century is western Gothic in style (I pl. 44); the senate house or High court of appeal, for Catherine II, and restored 1866—it has a magnificent hall;

several Government buildings; and the arsenal founded 1473, rebuilt 1701-36 is situated close to the Nicholas gate. The house of prince Galitzine (17th cent.) covered with sheets of copper is one of the remarkable buildings.

The erection of the buildings in the *Kitay-gorod* were superintended by Peter Malloy or Petroc, an Italian, 1534-35. Here, but entering into the grouping of the buildings inside the Kremlin, are the domes of the church of S. Basil, or *Vassili Blajenny* (ROSENGARTEN, p. 153), but which is only one of twenty-one small churches contained therein, the whole being known to the natives as *Pokrovskoi sobore*, or cathedral of the Protection of the Virgin, or the Blessed Basil. It was erected for Ivan IV, 1554-5, by a German or Italian and native artificers, the tradition being that the eyes of the architect were put out that the building might remain the only structure of the kind; parts were built 1588 and later, and it was under repair 1744-84; FERGUSSON gives the plan, fig. 913; it is about 150 ft. square, two stories high, with eleven domes glittering with gold and paint outside, and grouped round a central tower (II pl. 22; and I pl. 11 to 17). LYALL, in *History of Moscow*, gives the names of these churches. The church of S. Nicolas of the great cross was rebuilt 1688 (II pl. 38). The church of the Mother of God of Georgia, built in the seventeenth century, is small, nearly square in form, from the roof of which rise elongated octangular spires crowned with five bulbous-shaped domes, terminated by the orthodox cross (II pl. 36). There are also many chapels, two being in the main street from the S. Nicholas gate in the Kremlin, and the one attached to the church of the Mother of God of Vladimir. The house of the town council was formerly the university; the printing office of the Holy Synod is a fine building. Here is the corn magazine, the custom house, fish market, and the remarkably Russian institution, the *Gostinnoi Dvor*, built 1677, resembling the bazaars of Constantinople, or the French *passages*; it is of very large size, and three stories high, accommodating about a thousand merchants. At the west end of the street is the cathedral of the Virgin Mary of Cazan, erected 1630. Many fine palaces of the nobility; the university, the oldest in Russia, founded 1755 or 1786, which suffered in 1812, the fine library having been then destroyed, it has now upwards of 160,000 volumes; an observatory is connected with it: the palace of general Apraxin, the longest in Moscow, rebuilt soon after 1812; the palace of Pashkof, one of the finest specimens of architecture in the city, is now the public museum and contains the Rumiantsoff museum 1823, removed from St. Petersburg; the library consists of about 160,000 vols.: also the Galitsin museum (he died 1860); the church of S. Dmitri Selounsky, 1559, and that of S. Simeon Stylites beyond the Yaouza stream are worth notice: the fine Suhareff or Soukharew tower, at the northern part, 210 ft. high to top of vane, built 1692-95 for Peter the great (mixture of Lombard and Gothic, II pl. 44), who is supposed to have made the drawings, adopting the tower of Amsterdam or Augsburg as a model; since 1829 it has served as a reservoir for the water supply of the city brought in pipes ten miles: the remarkable stone palace of Romanoff, in the Varvarkaia, in which the czar Michel Fedorovitch was born; it dates from the fifteenth century, and was restored 1856-59 (II, pl. 48 and 49); and the splendid monument erected for Alexander in honour of Minin and Pogarskii, who delivered the country from foreign invaders in the seventeenth century, and placed on the throne Michael Romanoff, the first sovereign of the reigning family; the bronze statues are 14 ft. high, on a single block of red granite, with bas reliefs; it was designed by Martos, a Russian artist.

In the *Beloi-gorod* is the celebrated riding house, the largest in Russia. Two thousand infantry and one thousand cavalry can be exercised in it at the same time: it will hold about 18,800 persons, occupying 5 ft. each. The ILLUSTRATED LONDON NEWS, February 15th 1868, p. 167, records it held 500

musicians and 12,600 spectators at a concert given in January 1863, by Hector Berlioz; states it is 560 ft. long, 168 ft. wide, and 43 ft. high; and also notices that it is concealed by a flat boarded ceiling at about 30 ft. from the ground. This military exercise house was erected 1817 by major-gen. Carbonier or Charbonnier from a plan by lieutenant-gen. Betancourt: it is 550 ft. by 150 ft. within the walls, which are 10½ ft. thick; the roof supported by forty-five trusses at 12½ ft. distance apart, and is perforated by two rows of forty-four dormers alternating. The tie beams, which are 168 ft. long by 22½ in. high and 11½ in. thick, are formed of two rows of beams joined at their ends and lying upon each other: there are five beams in the upper row and four in the lower, the whole secured by bolts and straps. The king post is 28 ft. high. The details of this interesting construction have perhaps not been illustrated. RONDELET, *L'Art de Bâtir*, fol., Paris, 1812, pl. 113; KRAFFT, *Charpente*, fol., Paris, 1819-22, pt. 2, pl. 39; STUART, *Dict. of Architecture*; TREDGOLD, *Carpentry*, 4to., Lond., 1820, all give the other design for the roof of a riding house usually said to have been erected 1790 for the emperor Paul, 235 ft. span, and covering a building 1920 ft. long by 310 ft. wide externally; but CRESY, *Encyc. of Civil Eng.*, 8vo., 1847, states correctly that it was not erected. Here is also the church of the Assumption in the Pakrovka, erected about 1601, for Boris Godonoff, which may be considered one of the finest structures of the mixed Gothic and Italian style in Moscow; it was endeavoured to be saved by Napoleon in 1812. The church of S. Nicolas aux stolpy, or église sur la tour, or église S. N. aux colonnes (II pl. 37), seventeenth century, in the old style: and the church of S. Nicolas on the Bersenovka (I pl. 20).

The *Zemlianoi-gorod* contains some public buildings: the monastery of Zatchatiesko, its church of S. Anne is Gothic; the large dépôt of the commissariat; the dépôt for spirits forming two very large squares; the medico-chirurgical academy, a large Doric building, etc.

In the *Slaborde* is the church of the Ascension, built before 1835, in a modern style with a colonnade and frescoes.

A first stone of a temple to the Holy Saviour, was laid 1817 on Sparrow's Hill, by emp. Alexander, to consist of three churches one above the other, the design for which in the Greco-Roman style was prepared by ... Wittberg (II pl. 47); but the scheme was given up, and the present edifice was commenced 1834 near the bridge, from a design by Constantine Thon, a German architect (Russo-Byzantine style), and is expected to be completed about 1880: it has five gilded domes (II pl. 43 and 43a). A considerable portion of it is built of "Labrador stone".

A design for an imperial academy was made by J. F. Blondel for the empress Elizabeth (1741-62); the gymnasium dates 1803. Among the seven hospitals is that of Galitzin (end of 18th cent.); of Sheremetof resembling a Grecian temple 1803-10 for 180 beds, to which 40 more were added 1810, and others since; and the foundling, erected 1764 for Catherine II, from a design by lieutenant-gen. Betskoy, the principal building is 301 ft. long and 112 ft. deep, of five stories; a square to the right is 441 ft. by 336 ft., also of five stories; the offices are 1260 ft. by 42 ft.; it accommodates 1200 children, and said to contain 3000 persons. The lunatic asylum 1791 has two stories of eighty wards. The barracks have been erected since the reign of Paul, and accommodate about 18,000 men: the one in the former palace built for Catherine II, holds about 7000 men; that of Khamovnecke about half the total or 8000; that of Pacrofca 2600, etc. The barrack for the regiment of Astrachan and its hospital, all by Rusca, is given in his *Recueil*, fol., S. Peters., 1810, part c, pl. 1-6. The chief military hospital founded by Peter the great can contain 1500 patients.

The situation of the church of S. Athanasius, and S. Cyril in the Seevtsova Vrajca (1514), by Aleviso: and that of S.

Nicolas Yavlennago who revealed himself, are not identified (I pl. 44).

The theatre was erected 1759 by the poet Soomarockof in imitation of the one he had built 1756 at S. Petersburg; Maddox, an Englishman, built another in the reign of Catherine II (1762-96), which was burnt 1805 or 6, destroyed in 1812, and rebuilt 1824; it was 255 ft. 6 in. by 210 ft., and 84 ft. wide at the curtain; this was burnt in 1852; and a new one built 1856, for 1500 persons, by Albert Cavo, to whom the emperor Alexander gave the cross of a commander of S. Vladimir and a pension of 6000 fr.; it has six ranges of boxes and will accommodate 2,300 persons, with abundance of room for each; the stage is 72 ft. (22 metres) wide.

The number of important monasteries at Moscow and in the neighbourhood is a striking feature; they are extensive, combining large conventual buildings, many chapels, bell towers, and burial places. Besides those already noticed, are the New S. Saviour's 1462, rebuilt 1615, having a belfry built 1758-85, 236 ft. high, and the finest in Moscow: the Simon-off 1390 near the Foundling hospital, in which the church of the Assumption (Byzantine), the oldest of its six churches, was built 1379-1405; its great attraction is the belfry 330 ft. high, erected 1839-44 by a merchant who gave 400,000 roubles in house property: near it is the Novopaski monastery 1490, walls built 1571 and again 1640-42; in it are buried the early members of the Romanoff family; there are five churches and a handsome belfry 235 ft. high, built 1759-85: the Don-skoi, 1592, the walls painted in streaks white and red, the principal of the six churches and chapels was built 1684-1712; the second one 1592, 1659; two in 1714, and a fifth more modern: the S. Peter's, rebuilt 1505, has six churches, of that S. Sergius, the belfry and the cells were built 1690 by order of Peter the great: the S. John's, having five churches, of which S. John was built 1479, and its belfry 1722: the Streteneva, erected for William (after 1367): the Novo-Devichti, the walls of which are flanked by sixteen towers, founded 1524, it has six churches and a cemetery with several good tombs; and the cathedral of the monastery of the Resurrection, called the new Jerusalem (I pl. 37-43).

At a short distance is the Petrofscoy or Petrovski palace, where Napoleon I took refuge after leaving Moscow, 3rd September 1812; it is one of the sights of the city, and a creation of empress Elizabeth (1741-62), or erected for prince Potemkin; it is fantastically built and glaring in colour and is of brick; the embattled walls of red and white, enclose a large courtyard, at the end of which is the palace; Loudon, *Enceye. of Cottage*, etc., 8vo., Lond., 1842, p. 198-9; and *Gardener's Magazine*, vii, 8vo., Lond., 1826-43, p. 661, fig. 145; also gives *Tzaritsina*, near Moscow, fig. 149. Loudon also notices the villa of princess Dashkof, built 1829 by captain Alexander; and Kuskovo for count Dmitri Nikolaivitch: the villa of the late empress, formerly the property of count Orloff, is noticed in MURRAY. The church of the Nativity of S. John the Baptist in the forest 1531 (II pl. 16). The church of the beheading of S. John the Precursor in the village of D'yakov (I pl. 18-9, and II pl. 25), built 1529. The monastery of S. Sergius at Troitza, forty miles distant, 1342, re-established 1423 and cathedral built; at least half of its edifices were built for Ivan IV the terrible (1533-84); the walls founded 1513-47, extend 4300 ft., and are from 30 to 50 ft. high and 20 ft. thick; eight towers form the angles, one is given in II pl. 15; an entrance porch is given in FERGUSSON, *History*, fig. 911. Within it are ten churches, of which the cathedral of the Trinity is the most ancient 1423; the small chapel adjoining 1552, rebuilt 1623, and again 1779 and 1840: the large church of the Assumption with five cupolas 1555; that of the Descent of the Holy Ghost dates 1552; that of Sergius Radonjski, has an immense refectory and a gallery all round 1692; the iron roof 1746 is of very peculiar construction: a belfry 1769 by Rastrelli 290 ft. high, the bell in the

second tier weighing nearly 65 tons: the latest church was dedicated 5th August 1867, to Philaret the Benefactor; the sacristy of the monastery contains in four rooms valuable treasures of art; the palace within the walls was built by Peter the great. This monastery has a permanent school of art for producing pictures of the saints, etc. Near to it is the church of the Hermitage of Gethsemane, a specimen of the timber churches of the sixteenth century (II pl. 24), it was rebuilt 1844. 14. 28. 50.

A plan of 1663 from a contemporary work is given in RICHTER; of the whole town, in LEIGH, *Guide*, 12mo., Lond., 1835; of the Kremlin identifying the buildings existing in 1800, in CLARKE, *Travels*, 4to., Lond., 1810, who gives several views made from drawings by F. Camporesi, comprising the Pascof mansion, church of Nicola Vorobina, the Terem, the Ivan tower and church of S. Nicholas, and that of S. Basil; and the Petrovsky palace. Plan No. 191, by the Society for the Diffusion of Useful Knowledge; plan edited by P. Urbain, and description, 8vo., Mos., 1856; and plan of the town and the Kremlin, in MURRAY's *Handbook*.

S. von HERBERSTEIN, *Rerum Moscoviticarum Commentarii* *Moscovia brevisissima descriptio* et vicinorum: Woodcuts, fol., Basil. 1551; an earlier edition has a plan by Hirschvogel, fol., Vienna, 1549; German transl. by Pantaleon, fol., Vienna, 1557, also Basle 1563; Italian transl. by Fedrezzano, 4to., Venice, 1550. CORN. LE BRUN, *Voyage*, etc., fol., 1718. UTCHREJDEMI IMPER. VOSPILATELNAZO, 4to., engr. on text, three coloured plans, fol., S. Petersb., 1767-68-64. ADAM, *Voy. Pitt.*, fol., Mos., 1827-33. Historical sketch of Moscow, 12 views, 4to., Lond. (Ackermann), 1813. COMTE DE LAVEAU, *Descr. de M. and plan*, 8vo., 1824; and his *Guide du Voyageur*, 1835. ENGELMANN, *Vues—du couronnement de Nicolas I et Alexandra à Moscou*, 14 pl., fol., 1828. CADOLLE, *Vues de M.*, fol., Paris, 1825. SVININ, *Sketches of Russia*, 1831. COGHLAN, *Guide*, 12mo., Lond., 1836. HEATH, *Picturesque Annual for 1836*. DEMIDOFF, *Excursion Pitt. en Russie*, fol., Paris, 1848. SNEGIREV, *History of Architecture in Russia* (in Russian), fol., 7 vols., 1842-45-60. CUSTINE, *Russia*, Lond., 1854. D. GAY, *Descr. de M. et ses environs*, 8vo., M., 1856. *Moscou en 1856; descr. de cette capitale*, 16mo., S. Peters., 1856. LYALL, *Hist. of Moscow*, 4to., Lond., 1823. FERGUSSON, *Hist. of Arch.*, 8vo., Lond., 1865. LOWTH, *Around the Kremlin*, 8vo., 1868. FIAZZI SMYTH, *Three Cities in Russia*, 12mo., Lond., 1862. STANLEY, *On the Eastern Church*, 8vo., 1869, 4th edit. A view of the Kremlin from the timber bridge is given in the PENNY MAGAZINE, 4to., 1836, iv, 465. PICTON, *Notes on Arch. in Russia*, in *Builder Journal*, 1861, xix, 110. L'ANSON, *On the Kremlin*, read at Inst. of Brit. Archts., *Sessional Papers*, 20th January 1868, which has formed the foundation for the above details.

Notices will be found also in BELL, *Travels*, 4to., 1764. CHAPPE D'AUTEROCHÉ, *Voyage*, fol., 1768. PALLAS, *South of Russia in 1793-4*, 4to., 1812. KEPPEL, *India*, 8vo., 1827. COCHRANE, *Russia*, 8vo., 1824. BRENNER, *Russia*, 8vo., 1839. MACQUART, *Moscow*. VENABLES, *Domestic scenes*, 8vo., 1839. HILL (S. S.) *The Baltic*, etc. MAHONY, *The Baltic*, etc., 1857. KINGSTON, *Fred. Markham*, 1857. WEIR, *Excursions*, with a map, 1862. GEN. WILSON, *Narrative*, 1860.

MOSQUE (from the Arabic *maschiad* or *medsched*; Span. *mezquita*; Port. *masqueta*). The house of prayer of the Mahomedans. The entire edifice amongst the Moors generally forms a long square enclosed by walls and placed nearly north to south in its length—a more or less extensive part, almost always towards the north, is surrounded by covered porticoes, the middle being an open space serving both for a place of assembly and for prayer. This court is sometimes planted with trees, but more often paved, and it always contains a fountain or basin for the ablutions prescribed by the Koran. The ailes of the mosque open into this court, which the Spanish call *patio*, the wall they abut against having

MOSQUE



Mosque, Constantinople

Mosque



one or more doors, one of which, larger than the others, is generally placed in the middle and opposite the *maksourah* or sanctuary, where the Koran is deposited, which also indicates in every mosque, large or small, the *kiblah* or "direction" of the *kaaba* at Mecca, towards which a mussulman must turn while praying. The *mihrab*, access to which is only obtained by the imams or priests, is more or less extensive and always enclosed by a screen, on the left of which (that is the right of the spectator) is the *mahfil* or *mimbar* or pulpit richly ornamented and raised to some height, from which the *Koran* is read. In front of the *mihrab*, most often opposite, but sometimes in the side aisle, as at Cordoba, is a raised tribunal supported by columns used by the imam who announces the hour of prayers. The *mihrab* is always decorated with rich marbles, mosaics, pieces of silk, verses from the Koran, inscriptions, etc., and is often surmounted by a dome, sometimes, however, as at Constantinople, it rises from the centre of the edifice, and the mosque is then an imitation of that of Sta. Sophia. Schools, hospitals, public baths, and the tomb of the founder, are generally attached to the principal mosques: GIRAULT DE PRANGEY, *Arch. des Arabes*, 8vo., Paris, 1841, p. 25.

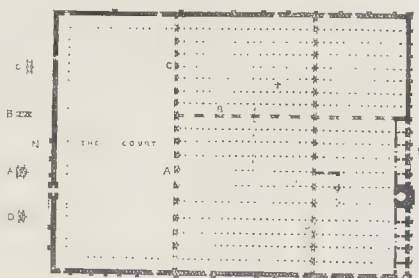
Fossati, *Aya Sofia*, etc., fol., Lond., 1852, with other writers, appears to call the above described *maksourah* the *mihrab* or holy recess; and the *mihrab* he calls the *maksourah*. CONDÉ calls the royal seat the "*macsurah*". The mosque is of various and almost of any shape. It is in fact a wall; and in poorer villages in India, the people dig a ditch, whitewash it, ornament it with flowers and convert it into a mosque. The next thing is to make a platform or pavement against the wall for the worshippers. In populous places it became convenient to enclose the space, which was done by building a wall so as to form a courtyard; this done, it became a complete mosque, such an one was called *EADGAH* or *Eedgah*. It might then be covered over to form a shelter from the rain or the heat of the sun. Then a place is provided for the ablutions of the faithful, which might be a fountain in the centre: also a place from which to call the people to prayer, either the roof or a minaret. The form of the mosque is not in all places the same. In Spain there were remains of Saracenic buildings in the form of a basilica. A dome is not an essential part of a mosque. Osman is said to have built porticoes to the temple at Mecca, in the year of the Flight 26, and this is the earliest recorded instance of this feature, perhaps for a shelter from the sun: El Azrakee says that Ibn-az-Zubeyr found the temple with only a wall surrounding it, which would bring the date of the porticos down at least to A.H. 64: BUILDER *Journal*, 1861, xix, 398. The domes of the mosques at Bagdad are remarkable not less for their unusual height than for being covered with glazed tiles of various colours, chiefly green, blue, black, and white, disposed with considerable taste. A good history of the changes in mosques is given in TEXIER, *Asie Mineure*, fol., Paris, 1839-49, i, 62-70.

Every town according to the Mahomedan law ought to have three mosques: one of which should be sufficiently large to contain the whole population. The mosques of Constantinople are of three kinds:—the little, called *medjid* or chapels; the larger, called *djamie* or *JAMA* or places of assembly, of which there are about 227; and lastly, the *djamié-i-Salatri*m or imperial places of assembly, of which there are 26; PORTER, *Turkish Empire*, 8vo., Lond., 1854, ii, 51. EVLIYA, *Narrative*, 2 vols., 4to., Lond., 1834-50, ii, 35, describes the requisites of the finest possible mosque; the buildings generally, i, 50-70; and the *mesjid*, 170. "In all mosques the boys were placed behind the old men, and the women behind the boys, by whom they were entirely separated from the men. At the close of worship, the men waited until all the women had disappeared. No maidens went to a mosque where there was not a place set apart for the reception of virgins, and every woman was carefully wrapped up and covered with her veils"; CONDÉ, *Domination of the Arabs in Spain*, 8vo., Lond.,

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1854, ii, 2. At Sta. Sophia at Constantinople, the women are placed in the galleries. In the town of Bahar, East Indies, are the remains of a massive stone building roofed with a number of diminutive domes, which partition its interior into as many cells, resembling the Patan mosques of the upper provinces.

The earliest mosque in Arabia was of course at MECCA, 705 A.D., but that and the one at Medina were rebuilt much later. The mosque of Amrou at CAIRO, built about 642; and that at Damascus 705, given in PORTER, *Five Years*, 8vo., Lond., 1855, i, 61, are two of the earliest existing. The mosque of Touloun at Cairo, about 879, said to have been the work of a Christian architect, consists of arcades round an open area: that of sultan Hassan, and that of Amrou, are in the form of a cross, with each arm arched over, the centre forming a large open square and containing the usual fountain. That at CORDOBA (as fig.) has a series of arcades side by side,



in front of which is the open court. The mosques at CONSTANTINOPLE are stately edifices: that of the Suleimanieh, built 1550-5 by Sinan, has a dome which is said to be of the same circumference as that of Sta. Sophia, but 21 feet higher: attached to it are two spacious courts, three schools, five academies, a school of medicine, an hospital, a kitchen for the poor, an imareth or resting-place for travellers, a library, a fountain, a house of refuge, and a *timerhazé* or lunatic asylum. DURAND, *Parallèle*, etc., fol., Paris, 1800, gives the plans of Sta. Sophia by sultan Achmet in 1610, and that of Suleimanieh II; that of Damas in Syria; of Cordoba by Adelrahman; and one at Pesth in Hungary. The mosque of Omar at JERUSALEM, is referred to in that article. COSTE, *Monuments Arabes du Kaire*, fol., Paris, 1839, gives the mosques of Hassan, Ghourgh, Qalaoum, Moyed, Azhar, Bargang, Kaidbey, Mohammed Bey, Teyloun, Scander pacha, and Amrou. *Illustrations*, s. v. Mosque, 1861, pt. 1, gives views of the mosques at Cairo of El Habakee and of sultan Hassan.

AZHARA. HARAM. FUTTEHPORE SECREE. DELHI. MANDOW. BOORHANPORE, has one without a dome. BOKHARA. SHAW, *Travels*, fol., 1757, p. 283, describes those in Barbary and the Levant. TOURNÉFORT, *Voyage into the Levant*, 4to., Lond., 1718. BUCHANAN, *Mysore*, 4to., Lond., 1807, i, 13; ii, 250, 413, 420. JACKSON, *Morocco*, 4to., Lond., 1814, 3rd edit., p. 141. KHANUIKOV, *Bokhara*, transl. by C. Bode, 8vo., 1845, p. 100, etc. *Description de l'Egypte*, modern part.

MOSS. The name given to a small size of slates sold at Liverpool for 14s. the ton of 20 cwt. of blue and red mixed in 1865; and for 18s. blue first quality, and 12s. 6d. second quality, in 1863.

MOSS. Tiles in some parts of Sussex are laid in moss. See HAY, and LYNCE or Ling; also LICHEN, which when found on gravel walks may be killed off or prevented by a watering of sulphate of copper or blue vitriol, better than any other salt. 4.

MOSUL, or properly EL MOSIL. The town is situated on the right bank of the river Tigris where it is about 400 ft. wide. It need only be noticed as the starting point of Assyrian research. BONOMI, *Nineveh*, etc., 8vo., Lond., 1852, pp. 2, 10, 80, etc. ASSYRIA; KHORSABAD, etc.

M M

MOSTAERT (GILIS) twin brother of Franz a painter, "is considered a good architect" of Flanders, as stated in VASARI, *Lives*, 8vo., Lond., 1852, v, 462.

MOSTIERS (P. . . . DE) was master of the works of the city of Montpellier about 1400, when in 1403 he repaired the bridge of Castelnaud; RENOUVIER ET RICARD, *Maîtres de pierre*.

MOTA (GUILLERMO DE LA), was appointed maestro mayor, with Pedro de Vallfagona, of the works at the cathedral at Tarragona; and on 23rd January 1416, in conjunction with eleven other architects, to report upon the best form of construction of the cathedral of Gerona of which Guillermo Boffy was at that time maestro mayor or chief director of the works. Mota is called "lapiscida, socius magistri in opere fabricæ," of the church, in the documents given in LLAGUNA. 66.

MOTAUDE (DIEGO ALONSO). Professor of architecture in Seville early in the sixteenth century, the most flourishing era of Spanish architecture. In the year 1500 he went over to the Canary Isles, where he was engaged to construct the cathedral of the city of Real de las Palmas. He marked out the floor-timbers, laid the foundations and the first stone, and continued the work until his death, when he was succeeded 1530 by Juan de Palacio. 66.

MOTE, see MOAT.

MOTEAU (PIERRE), was architect of the clock tower at Evreux, of which the foundations were laid in 1490; the greater part of the sculptures are by him. CHASSANT, *Notice sur la tour*, etc.

MOTHE (VALLIN DE LA), see LAMOTTE.

MOTHER OF THE GODS. Besides the usual temples in Egypt, there exists a class dedicated to the mysterious accouchement of the mother of the Gods, and called *mammeist*. Small temples of this form are common to all ages. One at Elephantine is given in FEROUSSON, *Handbook*, 8vo., Lond., 1855, i, 240. It is of a simple peristylar form with columns in front and rear, and seven square piers on each flank. He considers they were the originals of the Greek peristylar forms.

MOTTE (JEAN DE LA), intendant des bâtiments, was an honorary member of the Academy of sculpture and painting in Paris, 5th December 1722: he died 8th December 1738.

MOTTE-COQUART (. . . LA), was a member of the Academy of architecture at Paris, 1678.

MOUCHARABY, one of the ways of writing MASHARABI. 11.

MOUHASSEN (GIAFAR BEN), see BEN MEUHAZIN (G.)

MOUILLEFARINE (. . . .), architect, laid out the grounds around the dwelling of M. Camus at Boulogne (pl. 25); those of M. Duchastel, rue de Temple at Troyes in 1808 (pl. 27-32); and designed a fountain or ornamental waterfall for M. Delouvigny (pl. 39); a sheepfold, belvedere, and covered gallery in one building (pl. 46); an Indian pagoda (*sic*, i.e., a tower) and sheepfold for M. de Couvigny at Maisons (pl. 47); plan of grounds with appurtenances for M. Sternberg near Hamburg (pl. 51); and gardens and dwelling for M. Wirt at Enfrance (pl. 53); all given in KRAFFT, *Des plus beaux Jardins*, etc., fol., Paris, 1810, vol. ii.

MOUKDEN or FUNGTIEN FU. The capital of Mantchooria, built on a branch of the Liau in China. It is surrounded by a wall ten miles in circuit, with an inner one three miles in circuit, which encloses the emperor's residence, the government offices, courts, and other buildings connected with them, all arranged on a plan similar to those of Peking. In 1631 the Mantchoo monarchs made the city the seat of government, and succeeding emperors have done much to enlarge and decorate it. 50.

MOULD, see FUNGUS; DRY ROT; LICHEN.

MOULD. A matrix or form in which, or in accordance with which, something is made, cast, or executed. The *plumber* uses a mould or table on which lead is cast into a sheet; and others for casting pipes without soldering. The *plasterer* uses a mould for his ornamental work. The *ironfounder* for

his castings. The *glazier* has a mould, sometimes called the ingot mould, for casting lead into bars or *comes* fit for drawing through the vice, by which the grooves to receive the glass are formed; as well as another for moulding the pieces of lead which are fastened to the iron bars of the casement.

In casting some large works the moulds of wax or other material are supported within by a "core", and covered outside by a case or cap; the space occupied, if by wax, is melted out, and into it the liquid metal runs and forms the complete work.

In metal *founding*, the sand properly prepared in a frame receives the wood or metal model of what is intended to be cast, which is carefully pressed down so as to leave its impression in the sand. Channels are provided for the melted metal to run through into the cavity. After the frame is finished, the patterns are taken out by loosening them all round, so that the sand may not give way. The other half of the mould is worked with the same patterns in a similar frame, having pins which, entering into holes that correspond to it in the other, cause the two cavities of the pattern to fall exactly on each other. The two frames or mould then pass into the care of the caster. 1.

By statute of Edward III, the mould for making bricks for building was to be 9 in. long, 4½ in. broad, and when burnt the brick was 8½ in. long, 4 in. broad, and 2½ in. high. By 3 George II, c. 22, bricks within 15 miles of London when burnt shall be 8½ in. long, 4½ in. broad, and 2½ in. high. By Act of Parliament the size of the mould was settled at 10 in. by 5 in. by 3 in. in the clear; the shrinkage in drying reduces them to about 9 in. by 4½ in. by 2½ in. A woodcut of a mould is given *s.v.* BRICK, p. 139.

The sculptor Lysistratus of Sicyon, is stated to have been the first who made moulds of plaster to obtain casts in wax; PLINY, 35, 12, 44. Cast ornaments are sometimes made from a metal mould, but it is generally of a preparation of wax or of plaster, which is obtained from the original work either of clay or other material; the cast itself being of plaster, of paper, of composition, etc., and made in pieces so as to obtain the relief, when high, of the object. These soon wear out by often casting from them. Lately, by the use of gelatine, elastic moulds are formed capable of reproducing in a single piece the most elaborately sculptured objects, of high finish. The credit of the application of this substance is due, it is stated, to Mons. H. Vincent. The process consists in dissolving a certain quantity of gelatine in hot water, and running it into the object to be reproduced. When cooled, its elastic property allows it to be detached from the work. A choice sort of plaster is run into this mould, from which when dry the gelatine mould is detached: six copies may be taken from such a mould; BUILDER *Journal*, 1851, ix, 440; xi, 635. COLLE, *Journal of Design*, 1851, v, 131. 5.

The method of making casts of slightly carved work and inscriptions by wetted paper is well known. But no casts can be taken from them. Mons. Aimé Rochas of Paris proposed that before the exterior surface begins to dry, a layer of paste be laid thereon with a sponge or brush; to be left to get perfectly dry, and so kept when removed. If casts are to be taken, the interior surface is to be prepared by a mixture of two parts of resin melted in ten parts of tallow, used very hot and thoroughly soaked in, avoiding any filling up of the sculpture or writing. In casting, a table furnished with a rim is strewn over uniformly with sand, on which the exterior surface is laid and pressed down gently. A rim being made round the model, which is painted over with oil, the plaster of Paris is poured in, and to any thickness required. BUILDER *Journal*, xi, 199. Wax and Burgundy pitch moulds for taking casts of leaves and foliage, are described in the SOCIETY OF ARTS, *Transactions*, xli, p. 95.

MOULD. A contour, by which some materials are to be worked into shape, also called a *TEMPLATE*, commonly written

template (Fr. *épure* and *cherche*; Lat. *Forma*; hence perhaps the word *formers*, used in the *Fabric Rolls* of York Minster, published by SURTEES SOCIETY, p. 313, 347).

5. MOXON, *Bricklayer's work*, 4to., Lond., 1700, pp. 9, 29, gives directions for "describing mouldings on wainscot or pasteboard for patterns to cut bricks by".

The mason formerly used a piece of hard wood, called a *caliber* (Fr. *calibre*); it is cut out on the edge answering to the contours of the moulding to be formed in the stone, the two ends or heading joints of which are first worked and the intermediate parts are wrought down by straight edges, or by circular templets, according to the nature of the work. When the work is to be very exact, a reverse mould is sometimes used to prove it. At Canterbury 1175-8, William of Sens "delivered molds for shaping the stones to the sculptors who were assembled, and diligently prepared other things of the same kind": WILLIS, *Canterbury*, p. 36. "Mason made a molde thereto", *Vision of Piers Ploughman*, 7274; temp. Edw. III. 5th Edw. III, Sept. 30th; To John le Tressle of London, for two oak boards for moulds for the masons, at 12d. each. To the same for three oak boards called lidholts, for the said moulds, at 6d. each: at Westminster palace. 1-4 Hen. V (1413-6); Two hundred boards called "regold" waynyschoote and estricheboorde bought for making moulds thereof, £4 4s. 10d.; SCOTT, *Gleanings of Westminster Abbey*, 1861, p. 66. 1612; 25th January (new style), for the fremason at Burford quarry, one month's work £2, his son the same, 32s. "for bords to make moulds" 20d., and for two tun of stone at the quarry 8s., making £4 1s. 8d.; Accounts of Wadham College, in *BUILDER Journal*, 1850, viii, 375. 1629; Item, to the deacone for four grait double Scottis dealls for the muldis and platts, iijl. scots. Item, for three clifts of sawin dailis for that same purpois, xxs. Item, 16 Maii, for one aikin plank to be sawin for muldis to the deacone, xxij. Item, 19 Sept., for ten clifts of seasoned wainscot for the mouldrie to the deacone, iijl. 23 April, to Alex. Isaak, wrycht, for making the muldis, and to John Thomme, maisone, xxxvis. viiid.; Accounts of building Heriot's hospital, Edinburgh: *Transactions* of Architectural Institute of Scotland, 1852, ii, 39-40. The mason working at Norwich cathedral at the present day has all his moulds cut out of wood by the carpenter, although for his own works he uses those of zinc.

In Wintoun, Glamis, Craigievar, and other buildings in Aberdeenshire and Forfarshire, all the plaster ornaments are from the same moulds: ARCHITECTURAL INSTITUTE OF SCOTLAND, *Transactions*, iii, p. 37. 1604; Plasterer cutting moulds; CHEATHAM SOCIETY, *Shuttleworth Accounts*, 1582-1621, 4to., Manch., 1856-58, p. 151, 155, 172.

Plaster mouldings when required to be mitred at the angles are worked by hand, work which unless a skilled workman is employed is not well done. The *BUILDER Journal*, 1849, ix, 272, gives an illustration of a mould, horsed, that will run a molding at right angles and leave the mitre as perfect as any other portion of the work.

MOULD. In the sense of an edifice. "The ornature and alteration of the mould" of Windsor Castle, "according to the forme of building used in these our daies"; HOLINSHED, *England*, 1587, p. 196. "The mould of King's College chapel at Cambridge"; *idem*, p. 149. DRAWING.

"But full great pittie, that so faire a mould
Did on so weake foundation ever sitt".

SPENSER, *Fairie Queen*, 1599, Bk. I, canto iv, ver. v.

MOULDED OF PUZZLE GLASS. See GLASS, p. 47.

MOULDED BRICK, see MOULDING MACHINE; TERRA COTTA; ELIZABETHAN ARCHITECTURE; *Illustrations*, Brickwork, 1856-7, part i, two plates: and Cornice, 1848-49, part ii, and Detached volume: also BRICK CONSTRUCTION, to the publications named therein, besides the illustrations in many numbers of the usual English and French journals, may be

added the following:—ESSENWEIN, *Norddeutschlands backstein Bau im mittelalter*, Carls., 1863. FLEISCHINGER and BECKER, *Systematische darstellung der Bau constructionen*, fol., Berlin, 1863. DUGEN, *Constructions en Briques*, 4to., Paris, 1858. ADLER, *Mittelalter Backstein Bauwerke des Preuss. Staates*, fol., Berlin, 1860-5. NESBITT, in *Archæologia*, xxxvi, 1863. STREET, *Brick and Marble Architecture*, 8vo., Lond., 1875. HERDTLE, *Brick patterns from Suabia, 12th to 15th cent.*, two series, fol., Stuttgart, 1865. CHURCH BUILDER, 8vo., Lond., ii, xii, and xvii. ROYAL INST. OF BRIT. ARCHTS., *Sessional Papers*, 1873-74, papers by FOWLER and by PERRY.

MOULDING (Lat. *modulus*; Ital. *modanatura*; Sp. *mol-dura*; Fr. *moulure*; Ger. *simswerk*). A plane or curved narrow surface, either sunk or projecting from the face of the material, the various divisions advancing one beyond the other. An assemblage of mouldings forms one of the decorations of most styles of architecture, and each style and period of a style even is known by the peculiarity of the outline of the assemblage and the working of the mouldings. Mouldings are either left plain, or they are carved with ornament suited to the form of the outline; some examples have been found where the ornament has been painted on it; POLYCHROMY. The outline formed by a plane cutting the mouldings at right angles, is called the *profile*; the composition and delineation of this profile, whether single or united with other mouldings, is called *profiling*; and on the choice, disposition, and proportion of these depends the beauty or deformity of it. The most perfect are such as are composed of few mouldings, varied and alternating both in form and size, fitly applied with regard to their uses, and so disposed that the straight and curved ones succeed each other alternately. In every profile there should be a predominant member, to which all the others ought to be subservient, and appear to support and fortify, or to shelter it from the injury of the weather. 1. 2. 6. 14.

Mouldings are distinguished by different names; and they are described in this work under their distinctive appellations. In England, these names have been chiefly derived from the Greek, Roman, Italian, and French languages: they are probably all explained in WILLIS, *Architectural Nomenclature of the Middle Ages*, 4to., Camb., 1844. The arrangement and use of them during that epoch are well illustrated in PALEY, *Manual of Gothic Mouldings*, 8vo., Lond., 1865, 3rd edit., by W. M. Fawcett; also by SHARPE, *Subordination and Distinctive Characteristics of the Mouldings of the Seven Periods*, etc., paper read at Roy. Inst. of Brit. Architects, 19th May, 1851, and in his publications. VIOLETT LE DUC, *Dict.*, also treats well upon the subject. The so-called classic mouldings are to be seen in detail in most works treating on architecture; and the arrangement and use of them in Italian architecture in such works as Alberti, Palladio, Vignola, and others, ending with CHAMBERS, *Decorative part of Civil Architecture*, fol., 1759; and the editions of 1825 and 1826, wherein they are contrasted with those used in Grecian edifices; as well as in NORMAND, *Parallèle des Ordres*, fol., Paris, 1819, and London 1825; also MAUCH, *Neue Systematische Darstellung der Arch. Ordnungen*, etc., 4to., Potsdam, 1850; new edit., 1872. For the mouldings used in other styles, the special publications on those styles must be referred to.

MOULDING MACHINES. Machines of various kinds invented for the purpose of giving shape to a variety of materials. Such are those for making bricks, either of the square form or shaped into various mouldings: the machinery for builders, joiners, contractors, and timber merchants, such as Worssam's universal moulding, shaping, and recessing machine, peculiarly adapted for cutting circular or twisted mouldings of any form; sticking, circular, or straight sash bars, moulding, rebating, and grooving circular or straight sash frames; cutting moulding round raised door panels, moulding, chamfering, or edging ornamental balustrades, etc., or a pattern; forming housings in string boards for stairs, sinking recesses of any

form, etc. A sheet metal moulding machine is illustrated in the *Civil Engineer*, etc. *Journal*, 1849, xiii, 305.

MOULD or **MOLD STONES** are mentioned for windows both in the Ely Rolls and in those of S. Stephen's chapel (5, 13, 26 Edw. III), and were probably intended for the jambs of the windows, which being deeply moulded require larger stones than usual: the word is used in conjunction with *montals* and *forme pieces* in an account relating to windows, the stones used for arches were always called *voussairs*. 16.

MOULINS. The capital of the department of Allier in France, situated on the right bank of the river Allier, over which there is a level bridge of Coulandon stone, of thirteen elliptic arches, 64 ft. span each; it is above 700 ft. long, 42 ft. wide, and was erected 1756-64, at a great cost, on account of the foundations rendered necessary by the depth of water and the shifting banks, the four previous bridges having been destroyed in the previous century: its designer, DE REGEMORTE, published *Description du nouveau pont*, fol., Paris, 1771; and it is noticed in GAUTHY, *Constructions des ponts*, etc., 4to., Paris, 1809-16, i, pl. 5, p. 84. Louis II, duc de Bourbon, built the castle, which was completed by Francis I of France in the early part of the sixteenth century; but a square tower of the fifteenth century used as a prison, and some buildings erected by Catherine de Medicis, only now remain. The houses are built of red bricks, with joints of equal thickness, the fronts being ornamented with patterns formed in black bricks. Such is the château de la Palisse, fifteenth century, mentioned in VIOLETT LE DUC, *Dict.*, ii, 250-1. The public fountains, with the hôtel de ville, which has a colonnade, and the court house, deserve attention.

The cathedral dedicated to the Virgin, consisted only of a lofty choir of the fifteenth century; the vaults of the aisles and chapels are elaborately groined; the staircase, sixteenth century work, to the choir, furnishes a pretty example of open construction. The nave was completed 1848-57, by J. B. A. Lassus, in an earlier style and is lower in pitch. The church of the Visitation or chapel of the college has the monument, by Agheri of Italy, to Henri duc de Montmorenci, beheaded 1632 at Toulouse by order of Richelieu. The church du Sacré Cœur with twin spires is by Lassus. **ALLIER**, *L'Ancien Bourbonnais, Hist.*, etc., fol., Moulins, 1832-8. 14.

MOULMEIN TEAK, see **TEAK**.

MOUNGHTIE. A term used in the accounts of the building of the new hall at Hampton Court, 22nd Hen. VIII, as "payd to John Norse, merchaunt of Rome, for 4 mounghte of plaister of Paryshe, of him bought and delvered at the Toure wharf, at 6s. the mounghte". **FELIX SUMMERLY**, *Handbook*, 12mo., London, 1859, p. 63.

MOUNTAGUE (WILLIAM), was a pupil and for some years principal assistant to George Dance, who having resigned January 1815 the office of clerk of the works to the corporation of the city of London, Mountague carried on the duties as acting clerk of the works until 22nd February 1816, when he was elected to the vacant office. Among the buildings designed by him were Whitecross Street prison 1813-15, for 500 debtors (pulled down 1873); the courts 1823 of King's bench and Common pleas at Guildhall: 1828, the city library (pulled down 1871): 1828-29, Farringdon market at a cost of £30,000, (but of £200,000 including the site, which consists of 1 acre, 2 roods, and 33 poles; part of the west side was pulled down 1873 for widening Shoe Lane): the east or dais end under the large window in the Guildhall 1838 with Gothic panelling and niches in cement, at a cost of £425 (removed 1866 for the present oak work): 1842 the lofty attic on the front of the Mansion house was removed, and the present ball room ceiling formed: and 1842 the lobbies and committee rooms at Guildhall. Besides these works he made the valuations for purchasing the property required for widening S. Martin's le Grand and clearing the site for the new General Post office, commenced May 1824; also for the formation of King William Street

and of Wellington Street in the Borough, being the north and south approaches to London Bridge; and the formation of Moorfields Pavement, sir R. Smirke being employed as architect of the new houses in all these improvements; clearing the site for the new royal exchange, commenced 1841; for Moorgate Street, Prince's Street, and Gresham Street: and for the additional sites in Smithfield market, of which he constructed all the arrangements, and originated the method of "haltering" the cattle to rails on each side of paved alleys. He was district surveyor for the western division of the city from between 1804-10: had a large private practice in valuations; and was surveyor to the estates of sir Charles Morgan, the Sons of the Clergy, baroness von Zandt, the Thames Tunnel Company, etc. He died 12th April 1843, aged 70 years, and was interred in Bunhill Fields burial ground. H. J.

MOUNTAGUE (FREDERICK WILLIAM), only son of WILLIAM, to whom he was chief assistant; superintended the architectural department of the city office: and originated the lighting of Guildhall on festive occasions with gas jets round the tracery of walls and windows instead of festoons of oil lamps. He was surveyor to sir Matthew Wood's committee of the house of commons for metropolitan improvements, and laid out the various schemes referred to in their report, notably new Oxford street, since formed. He had a large private practice, and was steward of the estates of the duke of Buckingham; in performance of the duties of which he was thrown from his gig, and died in the night of 2nd Dec. 1841. H. J.

MOUNTAGUE (JAMES), younger brother of William, was from before 1827 district surveyor for the north division of the city of London; he designed 1822 the schools for the Benevolent Society of St. Patrick, in Stamford Street, Southwark; and was surveyor for the Port of London and for Blackfriars bridge. He died in 1852. H. J.

MOUNT BARKAL, also called and written **GEBEL BARKAL**, **Gibel Barkal**, **Jebel Barkal**, **Jibel el Barkal**, **Djebel el Barkal**, etc. A remarkable sandstone rock, near Meroë, in Nubia, nearly 400 ft. high. Five or six temples lie between it and the river, two of them with an avenue of sphinxes; the Typhonium and the great temple are the most remarkable; the former is 108 ft. long; the cella and sanctuary are excavated in the rock. The latter is one of the largest monuments in Nubia, but it is now a heap of ruins—bases and fragments only of its seventy-eight pillars are discernible: two propylæons, each 65 French feet long and nearly 40 feet thick, with the entrance between them 13 ft. wide, form the front. They date in the time of Tirhakah of the 25th dynasty, or in the 17th or 19th cent. before Christ. These temples are fully described in WADDINGTON and HANBURY, *Visit to Ethiopia*; RÜPPEL, *Reisen in Nubien*, etc. (1824-5), who supposes them to be about the eighth century before Christ; and in *Narrative of the Expedition by Ismayl pacha to Dongola and Sennaar*, Lond., 1822.

In front of the northern entrance to a brick building were found two lions of red granite, reclining on one side and looking towards each other; they are about 7 ft. long. They were brought to England by lord Prudhoe in 1832, and are now in the British Museum; one was found broken into several pieces in 1820 when first seen (LION).

A short distance to the north-west are eight pyramids, and to the south-west are nine other small pyramids; the largest of these which is entire is 40 ft. high; several have small exterior temples attached to one side, the roofs of which are flat, but one is arched. **CALLAUD**, *Voyage à Meroë*, fol., Paris, 1823-7. **HOSKINS**, *Ethiopia*, 4to., Lond., 1835, p. 134, 146-363. **RAMÉE**, *Hist. Gén.*, 8vo., Paris, 1843, i, 189, 193. **SOCIETY FOR DIFFUSION OF USEFUL KNOWLEDGE**, *Egyptian Antig.*, 8vo., Lond., 1836, i, 210. 14. 28.

MOUNTAIN BLUE. A carbonate of copper; see **CENDRES BLUE**.

MOUNTAIN LIMESTONE. This term was used by Mr. Smith to designate the calcareous rocks which underlie the coal strata in England: it is the equivalent of the "carboniferous limestone" of Conybeare and other geologists. As noticed *s.v.* LIMESTONE, these stones are not much used for building. An account of the Derbyshire marbles from this formation, and specimens from the Durham coal fields and other parts, sent to the Great Exhibition 1851, are described in *BUILDER Journal*, ix, 606, and need no further notice in this place; but the CRAIGLEITH stone near Edinburgh, a sandstone which immediately underlies that formation, is a valued material. CARPENTER, *A piece of Limestone*, in *Good Words Magazine*, October 1875, p. 713-20.

MOUNTAYNE. One of the old ways of writing MUNTIN in framing. 16.

MOUNT OETA, now called Katavothra. It is situated in the south of Thessaly. The only entrance into central Greece from the north is through the narrow opening left between mount Oeta and the sea, celebrated as the pass of Thermopylæ. DODWELL, *Cyclopiæ, etc., Remains*, folio, London, 1834, pl. 57, gives a view of ruins of a city, with the plains of Trachynia.

MOUNTSOREL GRANITE, near Loughborough in Leicestershire, was discovered by F. Place of York about 1700; WALPOLE, *Anecdotes*, 8vo., Lond., edit. 1862, p. 903. The quarries supply paving setts, cubes, kerbs, and broken granite for macadam roads. It is said for toughness and good foothold for horses to be unsurpassed by any other granite in the United Kingdom. GRANITE, p. 72. *BUILDER Journal*, xvii, 414; xix, 27. INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, 1850, ix, 225.

MOURE (FRANCISCO DE), of Orense, in Galicia, executed 1624 the carved stonework of the choir of the cathedral at Lugo, comprising a double row of stalls with basso and alto-reliefs, and of the Ionic and Composite orders. An inscription in Latin gives his name and the date of the work. 66.

MOURET (.....), was born 1705 at Moussi-le-Vieux, near Dammartin, in France. His principal works are at Paris, and comprise the enlargement and alterations of the hôtel de Saucourt, formerly de Maisons, rue de l'Université; hôtel d'Auvergne, rue et barrière S. Dominique; hôtel des Vertus, rue de Bourbon; hôtel de S. Simon; 1736-37, the manufacture de teinture at S. Denis; and 1746-47, the manufacture royale des rubans. Also the château de M. de Beaufremont near Besançon; and 1751, the hôtel-dieu, near the Retiro at Madrid in Spain, which is highly praised by BLONDEL, *Arch. Française*, fol., Paris, 1752, i, 257. The date of his death has not been ascertained. 5.

MOURGAUB. This valley lies about forty-nine miles north east of Persepolis, and contains numerous ruins. One is called by PLINY the castle of Pasargadæ, it was occupied by the magi, and in it was the tomb of Cyrus. Beyond is Taclit e Taoosht, Hareem of Jamshid, a high piece of ground on which is a solitary column like those at Persepolis, and seven similar ones on the ground, with thick walls, etc., remains probably of a palace and a temple. Near to it is Naksh i Roustam, where on the almost perpendicular face of the mountain are rock-cut tombs; one being supposed to be that of Darius Hystaspes. These were all investigated and described by Sir R. Ker Porter, *Travels*, 4to., i, 120; and are noticed in BONOMI, *Nineveh*, etc., 8vo., London, 1852, p. 116-20. PORTER conjectures from the mounds and fragments scattered about in various directions, that the capital (PERSEPOLIS) originally extended from the pillared ruins along the whole foot of the mountain, connecting itself with Naksh i Roustam, and thence spreading over the plain to the north-west. FLANDIN, *Perse Ancienne et Moderne*, folio, Paris, 1844, plate 173, etc.

MOUSE (Fr. pince). A small weight to which a cord is attached, used by plumbers for clearing a stoppage in a

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closet pipe (Fr. *dégorgier*). The carpenters also use a similar weight for passing a sash line over the pulley. 5.

MOUSSY DE S. MARTIN, master of the works of masonry of the Bourbonnais, was architect of the castle at Dijon, begun 1478, continued 1484, and finished in 1512. CHAMBERE, *Dijon*, etc.

MOUT. A town of Asiatic Turkey near Konia, built on the site of an ancient Greek city; the chief streets, temples and other public buildings of which are still clearly to be distinguished. It has a castle flanked by square towers.

MOUTARDIER (ROBERT LE), built about 1475 the tour de la Haye at Amiens, of which the design had been given by Pierre le Tarisiel. In 1484 he was directed to pull down the porte du grand pont, which was of Roman workmanship and stood at the end of the chaussée S. Pierre. The same year he worked at the church of S. Germain, also at the hôtel Monceaux in the rue du Port. About the same time he raised the tower of the Preaching Friars; and he is considered to have built the choir of the old church of S. Jacques, now destroyed. DUSEVAL, *Recherches Hist.*

MOUTH. See BIRD'S MOUTH; and CAVETTO.

MOUTIER, architect to the département de la Vienne, with MALPIÈRE, designed 1821 the maison d'arrêt at Cherbourg (Manche); GOURLIER, *Choix d'édifices*, fol., Paris, 1825-36, i, pl. 23 and 24; in addition to the parish church of S. Germain en Laye, as stated *s.v.* Malpierre. His other works and the date of his death are unknown.

MOUTIERS TARENTEISE (Monstiers or Monasterium apud Centrones). A town in Savoy, situated on both sides of the river Isère, which is crossed by two bridges. It is the see of a bishop, and has a cathedral dedicated to S. Peter the apostle; a church dedicated to the nativity of the Virgin Mary, and two others; a large episcopal palace; a monastery dating from 420, with a noted succession down to 1793 (COMMENVILLE, *Hist. de Tous les Archevêques*, etc.); a royal college, a hospital founded in the tenth century, and other buildings. The stone quarries near supply a breccia usually called TARANTINE BRECCIA. 14. 96.

MOULTON (ADRIEN), born 1741 at Marseilles, gained the grand prix in 1764 for a college; and received his brevet for the school at Rome, 20th Sept. 1765.

MOVING OR RUNNING LOAD, see LOAD.

MOVING an erection or any very weighty material. The statements of some ancient writers, and proofs by the moderns, of immense weights having been moved are recited *s.v.* MOXOLITH. WILKINSON, *Ancient Egyptians*, iii, 325, remarks, "it is singular that we find no illustrations of the mechanical means of a people who have left so unquestionable proofs of skill in these matters (of moving and raising heavy weights): blocks were taken from the quarry on sledges; and in a grotto near El-Bersheh is a representation (given on p. 328) of a colossus, which a number of men are dragging with ropes, of the early age of Osirtasen II."

BELZONI in his *Narrative of Operations*, etc., 4to., Lond., 1821, and folio plates, p. 131, details the manner in which he moved into the boat on the Nile the colossal head of Memnon, now in the British museum, which is somewhat more than 8 ft. high, and of red Syene granite, weighing between 10 and 12 tons: his tackle consisting of only four poles and ropes, levers and rollers. As regards the methods adopted by the Assyrians in moving their colossi, LAYARD, *Monuments of Nineveh*, fol., Lond., 1853, 2nd series, gives from Kouyunjik the following illustrations:—pl. 10. obelisk or stone in a boat; pl. 11. workmen towing a boat containing an obelisk or a block of stone; pl. 12. Sennacharib superintending the moving of a colossus; pl. 13. Assyrians moving a colossal winged bull; pl. 15. drawing a winged bull to the top of an artificial mound; pl. 16. drawing an upright bull; and pl. 17. workmen with implements and ropes for moving a winged bull. Pl. 10 and 11 occupied altogether eight slabs, unfortunately the upper part

of all of them had been entirely destroyed. A full description of these bas-reliefs is given in chap. v, of his smaller work, *Nineveh and its remains*, 2nd edition, 8vo., London, 1849; those contained in pl. 12, 13, and 15 are in the British museum.

Detrianus (name in dispute), an architect of the time of the emperor Hadrian (117-138), was employed to remove the colossal statue of Nero; SPARTIAN, *Hadr.* 19. The method of moving and taking to Paris one of the Luxor obelisks in 1831, is described by DE-LA-BORDE, *Précis des opérations*, etc., 1832; a view of the operation is given in WILKINSON, *Topography of Thebes*, 1835; a short statement in LIBRARY OF ENTERTAINING KNOWLEDGE, *Egyptian Antiquities*, 1836, ii, 375; and the raising in Paris, in J. B. A. LEBAS, *Histoire de la translation*, etc., 4to., Paris, 1839. The moving of the granite rock for the statue of Peter the great at S. Petersburg, in CARBURI DE CEFALONIE, *Monument*, fol., Paris, 1777. The works in connection with raising the obelisks at Rome, by D. Fontana, in ZABAGLIA, *Contignationes*, fol. Rome, 1743.

The method of moving and raising a house, and some other examples, with also a church, as practised in New York, is detailed, with woodcuts, *s.v.* HOUSE MOVING, to which is added a notice of the removal of Sunderland lighthouse. Other notices of such attempts as regards houses will be found in the *BUILDER Journal*, iv, 48; xv, 168; *BUILDING NEWS Journal*, iii, 319; *ILLUSTRATED LONDON NEWS*, 1848, xiii, 64; and *ALLGEMEINE BAUZEITUNG Journal*, 1844, pl. 626. The *MECHANICS' MAGAZINE*, p. 59, noticing the attempt at New York in 1823, was perhaps the earliest to record this modern ingenious invention of a Mr. Brown of Massachusetts. Aristotile Alberti, or Ridolfo Fioravanti as he is also called, moved 1455 at Bologna the brick campanile (the torre della Magione) of Sta. Maria del Tempio, 65 ft. high, with all the bells, to the distance of thirty-five feet: it was pulled down March 1825. In 1727, when the church of S. Leu and S. Gilles in Paris was repaired, a carpenter named Guillaume Guérin removed the clock tower, which contained a bell weighing two tons, from the top of a tower which was in an unsafe condition to another which had been erected at a distance of 24 feet; a scaffolding was erected and the belfry was moved along on rollers without disturbing even the leadwork with which it was covered. Some accounts state he only repaired the church.

At Worcester, Massachusetts, a chimney stack 100 ft. high, weighing 170 tons, was moved 150 ft. and turned partly round with complete success; *BUILDER Journal*, 1863, xxi, 449. A wind flour mill, with all its fittings, was removed from West-acre to Clenchwarton, Norfolk, a distance of sixteen miles, about June 1870, and was effected safely. A wall at New York, 70 ft. high, 16 ins. thick at the base, and about 12 in. at the top, thirty years old, and built of second-hand bricks, was moved eighteen inches in three hours safely; it weighed 250 tons; *BUILDER Journal*, 1875, xxxiii, p. 891.

A fine purple beech tree, 50 ft. high and 58 ft. across the branches, the mass of soil and undisturbed roots being 16 ft. by 14 ft., weighing over 20 tons, being required to be moved, a timber platform was formed under it and the tree raised upon rollers laid on planks by means of screw-jacks, and drawn to its new site by pulley blocks; the tree was maintained throughout in a vertical position; *BUILDING NEWS Journal*, 1869, xvi, 222.

MO-WANG, also called TSE-TAN. A wood of China, called the "prince of woods", the natives having no other timber equal in beauty to it. It is a sort of rose-wood, and is appropriated to the finest sort of joiners' and cabinet makers' work; whatever is made of it is held in great esteem; GUTZLAFF; and DE HALL.

MOXSON (JOHN). His name with "des. del. et Super." is attached to an engraving of the Mixed Cloth hall at Leeds, as built June 4th 1756—August 22nd 1758, a copy of which is in the King's collection, British Museum. It stands on

three sides of a site 364 ft. by 192 ft., with a court in it 330 ft. by 36 ft.

MOYNE (ANTOINE), constructed in 1533 the oratoire de N. D. de l'Espérance ou de Piatat, near Villefranche de Rouergue. ADVIELLE, *Les Beaux Arts*.

MOYNE (J. P. DE), see MOINE.

MOYNEL, MOYNIELLE. Old ways of writing MULLION.

MOZZETTI (GIOVANNI ANTONIO), of Naples, worked about 1646 with Pietro di Marino who designed the church of S. Pietro ad Aram in that city. 36. 95.

MSKET. The former capital of Georgia, situated on the rivers Aragvi and Kur. It is supposed to be the Artanissa and Misseta of Pompey, and the Harmastis of Pliny, and is considered one of the oldest towns in existence. It was formerly twenty miles in circuit, but now consists of mean houses, many of them half and some wholly underground; also a spacious cathedral in the form of a cross, with a cupola; the exterior work is like that at Annanour, intricate and full of labour, the interior painted with legends of saints; tombs of tzars and patriarchs still exist; also the mouldering walls with one chamber of the ancient palace of the princes, with those of the ancient castle and fortifications. PORTER, *Travels in Georgia*, etc., 4to., Lond., 1821, i, 103-110.

MTZKHEETHA. A town in Georgia, devastated by Timour in 1414. The cathedral, rebuilt in its original form for king Alexander who erected the cupola, which falling 1656 was rebuilt for Rostom the mahomedan king of Georgia; it is an imitation of the cathedral of Koutais. It is shown in DUBOIS DE MONTEROUX, *Voyage de Caucase*, etc., fol., Paris, 1839-43, pt. i, pl. 6, in two views, and pt. iii, pl. 32, fig. 7, the plan—text i, 424, and iv, 230. A tradition exists that an architect built this capital, and his pupil the town of Stepan-Tzmiada, and that the master seeing himself surpassed, cut off his hand in despair.

MUCHOS. A term used in HOMER, *Iliad*, for an inner chamber. INWOOD *Erechtheion*, fol., Lond., 1827, pp. 55, 63, and 64.

MUCIO (JUAN MARTINEZ DE), executed 1546 the chapels, tower, and façades, completing the parish church at Bezares near S. Domingo de la Calzada: the church at Sta. Coloma, for which he had 1537 also contracted, was completed by his brother. 66.

MUCIO (MARTIN IBARREZ DE), a resident in Garnica, completed 1546 his brother Juan's contract for the church of Sta. Coloma, near Nájera; in the same year accepted a contract, transferred to him by R. Ezquerro, for the erection of the parish church at Arenzana de Arriba, near Nájera, which he finished 1552; and in the same year 1546 he also undertook the erection of the parish church at Sojuela near Logroño, but he died before 1554, in which year it was finished by J. Ortiz de Gorostiaga; the interesting terms of the three contracts are preserved in LLAGUNO, ii, 34-5. 66.

MUCIUS CORDUS (CAIUS), see MURIUS.

MUCKISH QUARRY, situated five miles from Dunfanaghy, co. Donegal, supplies a sandstone, described as a quartz rock, open and porous, very pure white, semi-granular and semi-crystalline, traces of lamination, slightly calcareous. A cube of one inch was crushed with 14,930 lbs. Three other specimens of a more open and porous character were crushed with 6160, 7210, and 9940 lbs. respectively. A stone 3 ins. square with a foot bearing, broke with 2190 and 3310 lbs. respectively. WILKINSON, *Geology, etc., of Ireland*, 8vo., Lond., 1845, App. No. 100.

MUCKSURYEY, see DAMASCUS.

MUD BUILDING. See FORMACEUM or FORMARIUM OPUS. PISE WORK.

MUDDUNPORE. A town situated in a secluded position in the province of Bahar, in Hindostan. The principal Hindoo temple was polluted by the Mahomedan conquerors. A view of the interior of one near the town, is given in DANIELL,

Oriental Scenery, obl. fol., Lond., 1815, pl. 16, and v, pl. 16, of his large work, which shows the roof as constructed in the same manner as in the Egyptian temples; long beams of stone pass from the top of one pillar to the other both ways, and these carry flat slabs of stone forming the roof: a copy, in fact, of the rock-cut temple at Elephanta; *Egyptian Antiquities*, 8vo., Lond., 1832, i, 203.

MUELLER (LEONHARD), was *baumeister* 1524-33 at the münster at Freiburg im Breisgau. 92.

MUENCHEN, see MÜNCHEN.

MUENSTER, see MÜNSTER.

MUET (PIERRE LE), was born at Dijon, 7th October 1591; his father was "garde provincial" of artillery in Burgundy. He became conseiller, engineer, and architect to the king; and at first carried out the fortifications of several towns in Picardy by order of cardinal Richelieu: and served at several sieges under Louis XIV. He afterwards practised as an architect in Paris, where for Anne of Austria he continued 1654-65 (commenced by F. Mansard and J. le Mercier) from the first entablature the church and other buildings of the Val de Grace, faubourg S. Jacques: G. le Duc worked with him at the exterior and designed the curious baldachin carved by M. Anguier, and A. Broutel, sieur du Val, in the interior, according to BRICE. *Nouvelle Descr.*, 12mo., Paris, 1725, iii, 109; BLONDEL, *Arch. Fran.*, fol., Paris, 1752-6, ii, 62-71; BLONDEL, *Cours*, 8vo., Paris, 1771, iii, 303, pl. 52; and the GRAND MAROT. He also designed and laid the foundations 1656 of the church of the Augustins Déchaussés or the Petits Pères, near the place des Victoires, which was continued by L. Bruand and G. le Duc (BLONDEL, *Arch. Fran.*, iii, 21; PETIT MAROT). He designed the hôtel de president Tubeuf, afterwards Colbert, rue des Petits Champs: SAUVAL, *Histoire*, fol., Paris, 1724, ii, 202-4; the hôtel de Besons or de Torcy, rue Vivienne: about 1650 the hôtel de Chevreuse or de Luyne, rue S. Dominique (BLONDEL, *Arch. Fran.*, i, p. 255, pl. 4, and the GRAND MAROT, pl. 82), which was added to about 1720; the hôtel for Mons. Claude de Mesmes, comte d'Avaux, sold to Mons. Beauvillier, duc de S. Aignan, in the rue S. Avoye, dans l'île (BRICE, ii, 68; PETIT MAROT; SAUVAL, *Histoire*, fol., Paris, 1724, iii, 6), and disfigured by additions, as noted by LEGRAND and LONDON, *Descr. de Paris*, 8vo., Paris, 1809, when it was occupied as the *mairie* of the seventh arrondissement: a house for M. de l'Aigle, faubourg S. Germain, rue S. Dominique, près les Jacobins (GRAND MAROT, p. 58); a house in the rue S. Guillaume, belonging to the hôtel Dieu, and occupied in 1750 by the procureur général; BLONDEL, *Arch. Fran.*, ii, 294 and two plates; the château de Pontz (sur Seine) in Champagne; the château de Tanlay in Burgundy; and the château de Chavigny in Touraine.

He published *La manière de bien bastir pour toutes sortes de personnes*, 4to., Paris, 1623, with a second part, *Augmenté de nouvelles inventions pour l'art de bien bastir*, fol., Paris, (1645 or 1647), containing plates of six of the above buildings; followed by other editions in 1657, 1663, 1664, 1681, 1695, 1698, etc., a work considered of high merit by his successors; and translated by R. PRICKE, *Art of Fair Building*, 47 pl., fol., Lond., 1670; and 75 pl., 1675: *Traicté des cinq ordres d'Architecture traduit de Palladio*, 4to., Paris, 1626, in which, however, he put observations of his own as those of the author; also translated by G. RICHARDS, 4to., Lond., 1663; 1676, 3rd edit.; 1733, 12th edit.: *Les Règles des cinq ordres d'Architecture de Vignole*, 4to., Paris, 1631, 1632. These works were republished as *Divers Traictés d'Architecture*, 12mo., Amst., 1646. ROUYER ET DARCEL, *L'Art Architectural*, 4to., Paris, 1863-66, gives, i, 59, a ceiling, 1633-40, "from the hôtel Tubeuf in the rue Neuve des petits champs, sold to Mazarin 1633, afterwards the compagnie des Indes, then ministère des finances 1827, now the bibliothèque impériale". Le Muet died at Paris, 28th September 1669; LAMBERT, *Hist. Litt.*, 4to., Paris, 1751, iii, 138. His style is

perfectly good Louis XIV, and was very probably taken by Sir J. Vanbrugh for his guide. 5. 25. 34. 68. 113. 116.

MUFF. A term used in glass-making for the cylinder into which sheet glass is blown before it is flattened out.

MUGAGUREN (JOANES DE). Constructed the central cupola and lantern of the cathedral of Segovia, under an agreement dated 11th September 1615. STREET, *Gothic Arch. in Spain*, says the north door erected by him 1626 "is thoroughly pagan". 66.

MUGGIO (ANTONIO DE), otherwise written Antonius da Mugloc, was consulted 7th February 1415, on the works at Milan cathedral. FRANCHETTI, *Storia del duomo*, 4to., Milan, 1821.

MUHAMMAD. See MOHAMED, which is one of the old ways of spelling it.

MUHASIN (GIAFAR BEN), see BEN MEUHAZIN (E.)

MÜHLHAUSEN. The capital of a circle of the same name in Prussian Saxony, situated on the rivers Unstrut and Schwemmette. Numerous mills exist in the neighbourhood, from one of which—imperial property, with the settlement around it—the name may have been derived. It was one of the oldest imperial cities in Germany, but it was assigned to Prussia in 1802, an arrangement confirmed in 1814. It consists of the upper and lower town and four suburbs, and has four gates in the walls. The lower or old town, and the upper or new, both existed in the twelfth century. In 1181 they were burnt to a great extent, and then enlarged, and the two principal churches were built on the remains of the older edifices. Till the time of the Reformation it was under the ecclesiastical jurisdiction of the archbishopric of Mainz. It must not be confounded with Mulhausen or Mulhouse in France.

The largest and finest church, dedicated to the Virgin, is the parish church of the upper town. It appears from its architecture to have been commenced towards the end of the thirteenth and finished in the fourteenth century. The interior has five aisles, a transept and absidal choir. The western towers show Romanesque as well as fifteenth century work, but the style of the building is otherwise uniform throughout, and it is one of the best specimens in all Saxony. The church of S. Blaize is in the form of a Latin cross—a nave and two aisles; it is supposed to have been finished in the first half of the fourteenth century. The lower part of the two western towers are in the transition style, from Romanesque to Gothic. Two bells of very early date, 1281 and 1345, with engraved figures in relief, deserve notice. The church of S. George in the eastern suburb is reputed to be the most ancient church, although the present building cannot be older than the beginning of the 14th century. A watch tower on the ridge of the roof is remarkable, and a mortuary chapel or charnel house deserves attention. The church of S. Jacob contains in its northern and southern porches many sculptures of obscure meaning and small artistic worth. Plans and details of S. Mary's church (sometimes called the cathedral), and details of the other churches, are given in PUTTRICH, *Denkmale*, fol. Leipzig, 1836-52, iv, with eleven plates.

MUH MIEN. The native name of a timber tree of China; see BOMBAX.

MUIR'S VENTILATOR. This invention was put forward after Watson's double current ventilator and MacKinnel's concentric tubes. It consists of a square tube divided across the diagonals and finished with a louvre head. The inventor calculates upon utilising the slightest current of air, as he supposes that when it arrives at one of the sides, it will enter, descend, and force an equal quantity of foul air to discharge itself at the other sides.

MUJELIBE. A name given to one of the mounds near the site of BABYLON.

MUL'CKUF or MULGUF. A term used in Egypt, and called BADGIR, Bad guyr or Bad guir, in Persia, for a square tube or turret used in good houses for catching the current of

air and carrying it down into the apartments. *Detached Essay, Ventilation*, p. 8: WILKINSON, *Egyptians*, ii, 93, 120.

MULGRAVE CEMENT, see ATKINSON'S CEMENT.

MÜLLER (WOLFGANG), designed 1583-95 the church of S. Michael at Munich.

MULLION, found written in old records and later works, monelle, monyal, monion, monial (as also used by POOLE, *Eccles. Arch.*, 8vo., Lond., 1848, p. 243-6), moy-niale, moy-nicle, moynal, moynel, and monyall; (It. *regolo* and *stipito*; Span. *coluna*, *pillar*, and *liston*; Fr. *mencau*; Ger. *fensterpfoste*); also called montant, munion (WREN, *Parentalia*, 310), munnion (described by MOXON, *Mech. Exercises*, 1679, p. 166, as the upright post that divides the several lights in a window frame of a timber house), muntin, munton, and munting. The perpendicular pieces of stone used in mediæval architecture, sometimes like columns, or slender piers, which divide the bays or lights of windows or screen work from each other. In all periods, in less important structures, the mullions are often simply plain chamfered, and more commonly they have a very flat hollow on each side. In larger buildings there is often a bead or bowtell on the edge, and a single very small shaft with a capital; these are more frequent in foreign work than in English. Instead of the bowtell, they often finish with a sort of double ogée. As tracery grew richer, the windows were divided by a larger order of mullion, between which came a lesser or subordinate set, which ran into each other. A single mullion crossed by a transom in a rectangular window is termed in French *croisillon*. 14. 17.

Mullions were used for the first time in England at Westminster abbey. They superseded iron frames at the end of the twelfth century, and were built in courses corresponding with the other work of the wall in which they stood; as early as 1235, they were made of stones on end doweled with iron, but being found to become oxidised, the bones of sheep or horns of deer were used in the fifteenth century. With the perpendicular period came super-mullions; many windows with tracery of the richest description have mullions composed of single chamfers: VIOLETT LE DUC, *Dict.*, art. *Meneau*, who shows that in early work the mullion projected in the front part to receive the glass, but later it became only a sinking.

DENISON, *Church Building*, 8vo., Lond., 1856, p. 77, remarks on modern architects not making the mullions of a sufficient thickness (as had been noticed in the PENNY CYCLOPEDIA in 1839), probably about 4 ins. in the ordinary side windows, and perhaps 7 or 8 ins. in large east and west windows, thereby losing much effect; and he notes that at Tintern abbey, with eight lights, the principal mullion is 15 ins. thick, the two secondary ones 11, and the four smallest very nearly 8 in.; Guisborough priory, with seven lights, has two principal mullions both 15 in. thick; and the great mullion of the east window at Lincoln is about 24 in. thick. The two small east windows at Guisborough with three lights have 9 in. mullions, and those at Tintern 7 in. Some four-light windows at Whitby, have the middle mullions about 13 ins.; and even in the short clearstory windows at Bridlington priory they are above a foot thick. No mullion ought to be less than one-third of the width of the adjacent lights, and in all cases it appears that the depth ought to be at least twice the width or thickness. Some exceptions may be found in old Geometric windows.

A good method of fitting glass in stone mullions, is by a putty formed of Bath stone dust and oil, BUILDING NEWS *Journal*, 1869, xvi, 45; also in BUILDER *Journal*, 1864, p. 796, which also names hair mortar and plaster of Paris, and a second coat of mason's dust and plaster of Paris: good Portland cement having been found to crack the glass and split off the stone.

MULLOTE, situated in the salt range of the Punjab in Hindostan. Capt. Abbot discovered some temples, which are described by him in ASIATIC SOCIETY OF BENGAL *Journal*,

xviii. They are so extremely similar in detail to those of Cashmere, that there can be no doubt the same style prevailed in the plains, though few remains are now found. If they were, they would form a most valuable contribution to our knowledge of Indian ethnology and art; FERGUSSON, *History*, 1867, ii, 712.

MULSO or MULSHO (WILLIAM DE), canon of the new college at Windsor, was 1358 appointed by Edward III, supervisor of the works at Windsor castle, in 1361 clerk of the works there and elsewhere, and in 1362 chief warden and surveyor, succeeding W. de Wykeham in both appointments. He was succeeded in 1366 by A. de HERTYNGDON.

MULTON (JOHN). A deed bearing date 1st February, 28 Henry VIII (1536-7), from the prior and monks of Bath, in consideration of the good services shown and to be shown, "a dilecto nobis in Christo Johanne Muton, fremason", grants him "officium magistri omnium operum nostrorum vulgariter noncupaturum fremasonry cum primum vacaverit per mortem naturalem Edwardi Leycestre modo magistri operum nostrorum predictorum sive alia quacunque occasione." He was to have 40 shillings per ann., and a livery of cloth for a gown whenever the other lay officers of the priory had one. WARNER, *Bath*, App. 55, 1801, from *Harl. MSS.*, No. 3970. These two masons may therefore have designed the abbey church, commenced about 1499. See MOLTEN (JOHN).

MUNAL (HERNANDO), also a sculptor, resided near Valladolid, where he executed the granite porch leading to the second staircase of the building of the archives at Simancas; the amount for the work was fixed by Juan de Arfe, a celebrated silversmith, 22 June 1590, dated at Simancas. 66.

MÜNCHEN (Engl. MUNICH). The capital of the kingdom of Bavaria, situated on the west bank of the river Isar, over which there are two bridges, one of stone, 286 ft. long, 1823-28, by Probst and L. von Klenze; the other, the Reichenbacher bridge, 1832, of timber, 675 ft. long, both leading to the suburb Au, which is the largest of the six; S. Anne's formerly Lehel, Isar, Maximilian, Ludwigs, and Schönfeld, the last three are modern and contain a number of fine buildings (the first of them was erected under the care 1809-10 of H. K. von Fischer): each suburb has access to the old city by a gateway; the walls and ditch were removed in 1791; the Isar-thor (old German style, temp. Louis the Bavarian) was restored 1833 by F. von Gaertner, and has three towers. The see of Freising was added to that of Munich. The English garden is about half a mile wide and four miles long, consisting of about 500 acres; it was well laid out 1789 by Louis Skell, under the direction of count Rumford (LONDON, *Encyc. of Gardening*, 8vo., Lond., 1850, fig. 84), to both of whom there is a monument. A monopteral temple of twelve Grecian Ionic columns 1833-35, by L. von Klenze, forms a memorial to the elector Karl Theodore the founder of the garden: it exhibits the first application of Greek architectural polychromy in modern times (LITHOCHROMY). The monumental memorials in the city consist of the Mariensäule 1638; an obelisk of bronze 95 ft. high, 1828-33, by L. von Klenze; the equestrian statue of king Maximilian I, by F. von Gaertner and Thorwaldsen; the sitting colossal figure in bronze of king Maximilian Joseph I, 1835, by L. von Klenze and Rauch, 36 ft. high; the Siegesthor or arch of victory, 1845, opened 15th October 1852, is by E. Metzger after the death of Gaertner in 1847 (CIVIL ENGINEER, etc., *Journal*, xv, 392); the Propylæum or arch (Greek Doric) to commemorate the restoration of Greece, 1846-62, inaug. 30th October 1867, by L. von Klenze (BUILDER *Journal*, 1862, xx, 666); an equestrian statue to king Ludwig, 1863 (*idem*, xxi, 688); and statues of Klenze and Gaertner. All the following dimensions not in brackets, are supposed to be English feet.

The *Frauenkirche* or cathedral was built 1468-88 by Jörg Gankoffen; it is of brick, 336 (321 or 318½) ft. long, 115 (122) ft. greatest width, and 110 ft. high to the top of the vaulting. There are twenty-four chapels with tombs of the

founders. The windows 66 ft. 3 ins. high, nearly all contain coloured glass of the fifteenth and sixteenth centuries. The two plain west towers are 336 (350 or 318½) ft. high. The restoration of the edifice was commenced 1857 by Bergen and Foltz, and completed 1862; with a new oak pulpit by Sickinger; and a high altar. The interior is only remarkable for the mausoleum in the choir to the emperor Louis IV (died 1346), erected 1603-12 of black marble and bronze, from the designs of Pierre de Wit or Witte, called Il Candido, a pupil of Vasari; the bronze ornaments are by Krümper of Weilheim: SIGHART, *Frauenk. zu M.*, 8vo., Landshut, 1853. S. Salvator's or S. Saviour's, now the Greek church (late pointed), of brick, 1494. S. Michael, the *hof or Jesuiten kirche* (Italian), first stone 18th April 1583, and completed 1595, was designed by Wolfgang Müller; the steeple fell 1599, and was not rebuilt. DINDIN writes very highly of the interior as it appeared before 1821; it is in the form of a cross, vaulted and 280 ft. long, or 269 ft. 3 in. without the choir, and 81 ft. wide, and has no columns. It contains the tomb of Eugène Beauharnois, duc de Leuchtenberg, by Thorwaldsen. SS. Adelheid and Caietan or church of the Theatines 1670-75 by A. Barella of Bologna, the façade 1767 is by F. de Cuvillers: it is 220 ft. long by 120 ft., in the form of a cross with a central cupola; it is given in VITRUVIUS BAVAROIS: the royal family are buried in this church. The Trinity church, formerly that of the Carmelite nuns 1704-14, is a rotunda with a dome on eighteen Corinthian columns. The *Heilige Geist kirche* (renaissance) has a retro-choir, and a grating across the west end to form an entrance vestibule. The *Allerheiligen kapelle* or chapel royal, on the east side of the palace 1826-37 (Italian Romanesque) by L. von Klenze, is 145 (156½) ft. long, 103 (94½) ft. wide, and 84 (75½) ft. high; the chapel itself being 105 ft. long by 70 ft. wide; the columns are of red Salzburg marble. The frescoes are by Hess and his pupils: SCHREINER, *Frescogemalde*, etc., fol., Munich (1850), with 43 plates. ALLG. BAUZ., 1837, pl. 165-9, plans and details. The *Ludwigskirche* (Lombardic), 1829-8th Sept. 1844, by F. von Gaertner, at a cost of £73,128, the front, above 100 ft. high to the gable, has two towers 209 ft. high, the nave is 246 ft. by 43 ft. wide, and upwards of 80 ft. high; the Last Judgment by Cornelius is allowed to be one of the highest efforts of art in the present century. S. Bonifacius (Roman basilica similar to S. Paolo at Rome) 1835-50, by — Ziebland, is 250 (320, 284½) ft. long, and 120 (113½) ft. wide; it has a nave and two aisles on each side, divided by sixty-four monolithic grey Tyrolean marble columns 20 ft. long; the nave is 51 ft. wide and 70 (76) ft. high, the aisles are each 15 ft. wide and 40 ft. high. The pavement is of marble mosaic, the roof open timber work painted and gilt; the walls of the aisles are of scagliola; the paintings by Hess and his pupils Koch and Schnorr; there is a small subterranean chapel and a convent in the rear. *BUILDER Journal*, 1848, vi, 547; viii, 589: king Louis, 1868, and his queen are buried here. The *Pfarrkirche* or S. Maria-hilf in the Au suburb (German Pointed 14th cent.) 28th November 1831-39, is by Ohlmüller, of the lightest red brick pointed up: it is 222 ft. long, 80 ft. wide, with three equal aisles, and all 80 ft. high: the tower and pierced spire are about 256 ft. high; there are nineteen painted windows by Ainmüller and others from the designs of Ruben and Schraudolph; EGGERT, *Stained Glass Windows*, fol.; ALLGEMEINE BAUZEITUNG, 1842, pl. 478-80; described in ECCLESIOLOGIST *Journal*, iv, 87. The *Peter-kirche* is Romanesque; the Protestant church 1827-33, by — Pertsch, is an oval 143 ft. by 57 ft. The synagogue, by J. Métivier, was completed 1826.

The *friedhof* or southern public cemetery near the Sendling gate is of vast extent; it has a *leichenhaus* (DEADHOUSE and MORTUARY HOUSE); and near it is the *neue friedhof* or new public cemetery about 427 ft. square, with a cloister on each side; it was designed 1845 by F. von Gaertner; CIVIL ENGINEER, etc. *Journal*, 1847, x, 345. The northern cemetery was laid out

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1869 by Zanetti; in it were buried 300 soldiers of the wars of 1870-71. The central crucifix is by Halbig.

The *altresidenz* or old palace was designed by Pierre de Wit for Maximilian II (1564-72) and completed 1616; the west front is about 550 ft. in length; the *schöne* or *reiche kapelle* was also erected for Maximilian II; the latter building has a vast amount of lapis lazuli, jasper, gold, ivory, etc., even in the mosaic floor: the palace is given in DRESEL: it was much damaged by fire on 5th April 1749 and again 28th April 1762. This building has been greatly extended by the *neue residenz* or *königshaus*, and the *fest bau*, forming one enormous mass of building. The *former* (Florentine) was begun 1826-35 by L. von Klenze, it is 406 ft. long and resembles the palazzo Pitti at Florence. The interior is richly decorated with fresco painting and sculpture by Schnorr, Zimmermann, Kaulbach, Schwanthaler, and other artists (described by Mrs. JAMESON); and illustrated with details, ALLG. BAUZ., 1837, pl. 98 to 107; and decorations, 1839, pl. 259-79. The throne room is 58 ft. 6 in. by 33 ft. 4 in.; on the second floor, are the ball room 62 ft. by 37 ft. with semicircular ends; and the *blumensaal* or hall of flowers 68 ft. by 36 ft.: SEIDEL, *Die Königlichen residenzen*, fol., Leipzig, 1874. The latter, the *festbau* 1832-42, has a façade next the *hofgarten*, nearly 800 or 900 ft. in length (Palladian), by L. von Klenze: the throne room, 106½ ft. long and 73 ft. wide, has twelve colossal statues 10 ft. high of gilt bronze by Schwanthaler; ALLG. BAUZ., 1842, pl. 468-71. The *hofgarten* in it is a planted square of about 1100 ft. long from east to west, and 700 ft. wide: the north and west sides have arcades; the west side called *hofarkaden*, 1822, by L. von Klenze, is decorated with sixteen frescos illustrating events in the annals of Bavaria, completed 3rd October 1829, and is occupied by the bazaar, the principal front of which (Italian arches) 1822, also by L. von Klenze, faces the Odéon platz; and at the south-west angle by the *feldherrnhalle*, or hall of the marshals (copy of the loggia dei Lanzi) 1841-44, by F. von Gaertner: on the north side the frescos are painted in wax; and over is the old picture gallery lighted by side windows and now used for collections. On the east side is a large barrack.

The Leuchtenberg palace (Italian) 1817 is by L. von Klenze: the Wittelsbach palace (Pointed style) 1843-5, by F. von Gaertner: the palace of duke Maximilian (Roman renaissance) 1828-32, by L. von Klenze is 206 ft. by 300 ft., and insulated; the ball room is 60 ft. by 40 ft., and 35 ft. high: the house of madame Bayersdorf, one of the best of the new houses (up to 1859) is by J. Métivier: the queen's villa, 1844-6, near the Siegesthor, by F. von Gaertner: other houses by H. K. von Fischer, *cir.* 1810: the house of gen. major baron de Heideck, is given in ALLG. BAUZ., 1845, pl. 645; a private house in 1846, pl. 57; and 1850, text, p. 9, in a description of the use of coloured bricks (*rohbau*).

The *Kriegs ministerium* or war office (Florentine Italian), 1824-30, by L. von Klenze, 248 ft. long, with a return side 363 ft. in length. The mint is in a building erected 1573 as permanent lists for tournaments, the arrangements for which are still seen. The Doring or Törring palace (Italian), 1740, was by J. B. Gunetsrainer; it is now the *postgebäude* or post office; the north front 1834 (Florentine) by L. von Klenze is 290 ft. long and 66 ft. high, having an open loggia of thirteen arches with Doric columns (ALLG. BAUZ., 1836, pl. 73, elevation). The new *Rath-haus* (Gothic) 1872, in front of which is a bronze fountain by C. Kroll, and cast by Miller. The corn market, the most important in Germany 1852-3, by Ch. Muffat, architect to the city; it cost 1,545,000 fr., and 290,000 fr. for the site (DALY, *Revue Générale*, 4to., Paris, 1856, xiv, 272, pl. 26-7). The *reitbahn* or riding house (Italian) 1820-22, by L. von Klenze, is 300 ft. by 80 ft. The new law courts (modern German Gothic) 1863, by — Bürkeim. The *krankenhaus* or general hospital, 1808-13, by H. K. von Fischer for 500 patients; an addition for 100 beds was opened about 1866;

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the old one was "a singular failure", OPPERT, in *Sessional Papers* of Royal Inst. of Brit. Architects, 1867-8, p. 281. The house of correction or great prison is considered a model of its kind. The façade of the porcelain establishment 1820, is by F. von Gaertner. The royal bronze foundry, and the royal painted glass manufactory. The railway terminus was designed by — Buerhleim.

The *Glyptotheca* or sculpture gallery (German-Greek Ionic) 1816-30, by L. von Klenze, was built at the expense of Louis I while crown prince; it is about 220 ft. square, with a court in the centre. The sculpture of the pediment, which is recessed for these works like that at the temple of Ægina, was designed by Wagner, and executed by Schwanthaler, Leeb, Haller, and others. The *pinacotheca* or new picture gallery (Italian) 7th April 1826-49, by L. von Klenze, is of two floors and about 494 (550) ft. long, the ends projecting back and front. The centre forms seven large rooms, about 50 ft. high, lit by skylights, behind which are twenty-three smaller rooms, each lit by a window, and in front is a loggia 400 ft. in length. The floors and dados are of Bavarian granite; it was decorated by Cornelius (ALLG. BAUZ., 1841, pl. 417-9); a section and end given in CIVIL ENGINEER, etc. *Journal*, 1845, p. 333*. The new *pinacotheca* 1846, opened 26th October 1853, by — Voit, has six central halls, five minor ones on the south side, all lighted from above, and fourteen cabinets on the north side with windows; this is for modern paintings only; and is 368 ft. long, CIVIL ENGINEER, etc. *Journal*, 1847, x, 345; *Builder Journal*, 1853, xi, 677: 1863, xxi, 697. The Bavarian national museum of antiquities (old Gothic and Italian) 1858-66, by Reidel, carried out by Kuppelmaier, is 474 ft. long and 95 ft. high. The *ruhmshalle* or Bavarian hall of fame (Greek Doric) 1843-51, by L. von Klenze, built as a back-ground to the bronze statue of Bavaria, 61 ft. 6 in. high, on a pedestal of 28 ft. 6 in., by Schwanthaler; ALLG. BAUZ., 1855, pl. 686-9. The *kunstaustellungs-gebäude* or gallery of industrial art, opened 25th August 1846, was by Ziebland. The *bibliothek* or public library and record office (Florentine and Lombardic) 1832, by F. von Gaertner, has a grand staircase; the façade is 520 (495) ft. in length, and 85 ft. in height; the edifice is capable of containing 2,000,000 volumes, and has at present 800,000 vols. and 22,000 MSS.; *Builder Journal*, 1846, iv, 91; GAERTNER, *Sammlung*, fol., Munich, 1844-47.

The university, founded 1472 at Ingolstadt, was removed 1800 to Landshut, and 1827 to Munich; it has about 1400 students, and a library of over 105,000 vols. The *Georgianum* and also the university buildings forming a large quadrangle, 1835, by L. von Gaertner and continued by Ziebland; the two fountains 1814 by Gaertner. The school house, *cir.* 1814, by J. V. Himsel, with other public buildings. Royal academy of sciences, founded 1759, 1807, and in 1827; in the Wilhelm palace, by F. Cuvillers; the hall of antiquities, 1810, by H. K. von Fischer; was proposed to be rebuilt 1874. The *blinden-institut* (Florentine) 1834, by F. von Gaertner, is 214 (220) ft. in length. The *damenstifts-gebäude* (Florentine) 1836, by F. von Gaertner; the façade is 430 ft. in length; the church was by J. B. Gunetsrainer in 1732.

The old *hof theater* (or opera house) by F. de Cuvillers, *cir.* 1760. The new *hof theatre* with a Corinthian portico of eight columns 50 ft. high (polychromatic painted), was originally erected 1811-18, by H. K. von Fischer; it was rebuilt 1824-5 at a cost of £80,000, according to the first design after the fire of 1823 (ALLG. BAUZ., 1841, pl. 420-35); it accommodates 2500 persons. The *Odéon* (Italian) 1826, by L. von Klenze, corresponds with the Leuchtenberg palace; the large concert or ball room is 124 ft. long by 71 ft. and 50 ft. high.

The ALLGEMEINE BAUZEITUNG *Journal*, 1837, pl. 152-3, illustrates the *Braunhause* zum Haindl; other factories, pl. 154 to 160; and the *stearin-kerzen fabrik*, 1840, pl. 335. In the vicinity are the royal country seats of Nymphenburg (given in DIESEL), the hermitage in the gardens is by F. de

Cuvillers, *cir.* 1760; a plan of its English garden laid out by Louis Skell 1789, is given figs. 79-80, in LONDON, *Encyc. of Gardening*, 8vo., Lond., 1850. The royal manufactory of china is placed here. Schleissheim, built 1684-1700, is now deserted but having a few of its celebrated pictures: DIESEL also illustrates the "electoral" palace of Furstenried near the city, pl. 27: and LONDON, fig. 80, the grounds of count Monteglas, near the English park. 14. 28.

Map No. 192, of the Society for the Diffusion of Useful Knowledge: and in MURRAY, *Handbook*. WESTENRIEDER, *Beschreibung der Stadt*, 8vo., Mun., 1782. DIBDIN, *Tour in France and Germany*, 8vo., Lond., 1821, iii, 238, 322; 1829. DIESEL, *Palaces of Germany*, etc., fol., Saltzbourg, *cir.* 1720. JAMESON, *Visits and Sketches*, 12mo., Lond., 1834. KLENZE, *Entwürfe*, fol., Munich, 1832, illustrating most of his own designs; and KLENZE, *Die decoration—des Künigshaus*, fol., Wien, 1842. SCHORN, *Beschreibung der Glyptothek*, 8vo., M., 1830. SOELTL, *München; Hist., Topog., and Statist.*, 8vo., 1838. RACZYNSKI, *Hist. de l'art moderne en Allemagne*, fol. and 4to., Paris, 1836, ii. FASCHES, *Opera Architecte residentz zu M.*, 4to., Dresden, 1722. ZENETTI, *Das neue Gebäuhaus in M.* WEBB, *Ecclesiology*, 8vo., Lond., 1848, p. 137-48, notices the churches. UNGER and VOIT, *Sammlung von riesen*, 75 pl., fol., Mun., 1850. ROTTMANN, *Ornamente aus den vorzüglichsten bauwerken Münchens*, fol., Munich, 24 pl. FÖRSTER, *Entwürfe zu fresken in den loggien der Pinakothek*, by Cornelius; engraved by H. Merz, 4to.

FOREIGN QUARTERLY REVIEW, *Present School of Arch. in Germany*, 1834, No. xxii, Art. iv. GWILT, *Elements of Arch. Criticism*, 8vo., 1837, and Appendix, 1837. The article *Munich* in the PENNY CYCLOPEDIA, 1839, is very useful. PICTON, *Modern German Architecture*, in *Builder Journal*, 1858, xvi, 191, 233; and *Going along*, by the editor, 1863, xxi, 682, 697; a letter from the same, 1846, iv, 134. HOWITT, *Art Student in Munich*, 8vo., 1853. HALLMANN; LECHNER.

MUNDIR and MUNDUR. The name given to a private temple in Rajpootana.

MUNDUF. See MINDRA.

MUNDURE. The ancient capital of Marwar, in Hindostan, until Jodpore, about five miles distant, was founded 1439 in place of it. The fine tombs of the sovereigns and other ruins are described by Ton, *Annals of Rajasthan*, 4to., Lond., 1829, i, 280, 720-32; and ii, 15 and 18, who states that the walls are formed of immense blocks of stone closely fitted together without cement. In a large saloon are eighteen gigantic bas relief figures representing the tutelary divinities of the Rahtor Rajpoots; with other gigantic figures (in plaster?) He attributes some ruins to the Budhists or Jains; among those of late date the most important is the palace of Ajit Sinh, murdered in 1724, neatly built of stone and in perfect repair; THORNTON, *Gazetteer*, 8vo., Lond., 1858, p. 647: quoting BOILEAU.

MUNGRET ABBEY, see LIMERICK.

MUNICIPAL BUILDING. See TOWN HALL; HÔTEL DE VILLE; MAYORALTY; RATH HAUS.

MUNIMENT ROOM. (It. *archivio*; Fr. *chartrier*; Ger. *archiv*.) A room which ought to be strong and fireproof, in which to deposit charters, archives, or records; CHARTER HOUSE and ROOM. During the mediæval period, the muniment room of a monastery was sometimes formed over the church porch, as at Peterborough and at Fontenelle; in the south-west tower at Cluny, where the north-west tower was the prison; in an isolated tower, as at S. Martin des Champs and at Vaux de Sernay. It contained the matriculation lists, chartularies, terriers, and registers. The provost kept the key. It was occasionally built over the sacristy. It is placed near the south transept at Chichester; and is of large dimensions adjoining the choir at Salisbury. LENOIR, *Arch. Monast.*, 4to., Paris, 1852-6, ii, 374; FOSBROOKE, *Brit. Mon.*, ch. xlv; WALCOTT, *Church, etc., Arrangement*, 8vo., Lond., 1861.

Over the sacristy, now the vestry, at Writtle church, Essex, is the ancient muniment room, an apartment with boarded roof, and walls to this day free from damp; the timbers supporting the floor are very large and not more than half their own breadth apart; in the corner is a trap-door with ornamental escutcheon, plate and ring-handle; BUCKLER, *Churches of Essex*, 8vo., Lond., 1856, p. 205. At Norwich cathedral it is a stone-vaulted chamber, being the upper story of an apsidal chapel coeval with the original structure, of the time of king Rufus. At Bideford church, pulled down 1862, there was an underground room, access to which was by a trap under the side step of the communion table down a narrow stair, with a strong door at the bottom. The room contained two or three empty presses and chests, which were also visible through small grated windows from the outside. The floor above was of oak beams 7 in. square, and the room itself about 14 ft. by 15 ft. 6 in.

E. A.

Sir Francis PALGRAVE quotes various instances of the construction of record rooms, to show that no artificial warming or any mode of warming or means of ventilation except by the occasional opening of the door, is necessary to preserve the contents. Sir W. HOOKER says, "dry ground for the building and dry walls are indispensable; with these and a properly ventilated room, the action of the external air with its alternations of wet and dry can have no injurious effect upon dead vegetable matter": *The Record Office* in London, in *BUILDER Journal*, 1851, ix, 635-6.

MUNJADDY. A purple wood of Travancore, used for building houses only. 71.

MUNNION. An old way of writing MULLION, and applicable either to the vertical division of a window, or of a panelled framing, such as a door and wainscot. 2. 14. 16.

MUNNY MARTHA. A brown wood of Travancore, from one to six feet in circumference, used for furniture. 71.

MUÑOZ (DON FRANCISCO) as *maestro mayor* of the royal buildings in Spain, carried out the works of the outlet of the canal of Jarama and other necessary works for the irrigation of the royal grounds, as well as of the towns of Santistevan, San Martín, Cienpozuels, Seseña, Borox, and Añover. This canal was to be 29 ft. wide at the base, 30 ft. at the surface, with 5 ft. depth of water, and having sluices on either side at every hundred feet apart. Muñoz undertook the erection of the royal collegio of San Telmo in Seville; the first stone was laid 10th March 1682; the works proceeded slowly, but the dwellings for one hundred and twenty students, and for the directors and masters, the lecture and dining halls, the church and west tower, were completed 27th June 1734; the collegio was completed under L. de FIGUEROA and his relatives. 66.

MÜNSTER. The capital of the province of Westphalia in Prussia, situated on the river Aa. It was founded at the end of the sixth century, and called Meiland, and later Miningerode. In 1765 the fortifications were levelled and planted, but the ditch was not filled up; the eight gates still remain. The houses on both sides of the High Street, called *Principal markt*, are built over arcades of acutely pointed arches, some being as early as the beginning of the fourteenth century. The palace of the barons von Romberg and that of the Droste, both of the eighteenth century, and several large mansions of the nobility, are worth notice, as is also the house of John of Leyden.

The bishopric was founded by Charlemagne in 792, when he built a church and a monastery. The cathedral dedicated to SS. Peter and Paul and S. Lambert is a large, lofty, cruciform church (1225-61) with a *flèche* at the intersection, and a vast oblong castellated west tower. The choir with a five-sided apse is the very earliest transition from Romanesque to First Pointed—a transition example is very rare in that country: it was restored 1857. The double transepts are Late Pointed; the aisles are very low. A sort of galilee or narthex

on the south-west side is of Romanesque date: *Illustrations*, Porch, part i, 1863-5. The fine brass font is engraved in *Ecclesiologist Journal*, 1855, p. 367, and in KING, *Orfèverie*, fol., Bruges, 1854, ii, pl. 82: also two other fonts, pl. 63 and 75. The *Ueberwasser-kirche* 1340 is a fine late Middle Pointed edifice with a massive south-west tower, the spire was taken down 1533-55. The *Ludgeri-kirche* 1170-73 is of Nienberg limestone; the nave is of simple Romanesque with a good Middle Pointed apse; the very rich Gothic choir dates 1383; the octagonal belfry is of late date. The double stalls and two tabernacles of stone are early sixteenth century work: the church was restored 1856-1860-68. The *Lambertikirche* has a large western tower, which inclines greatly; the plan was designed 1375 by meister Cornelius; a jesse is over the outside of the south door. Some of the above are described by STREET in *Ecclesiologist Journal*, 1855, p. 367-9. The church of S. Maurice is of the twelfth century, it has three towers, that of the choir dates 1451; the chapel of the founder 1371: the restoration of the building "has been one of the most costly and beautiful attempted in Germany" (MURRAY). The church of S. Ignatius (Gothic) 1858; S. Ægidius, late seventeenth century work, is painted in fresco; S. Martin, twelfth century, with later additions, was restored 1859. The *Servatii-kirche* 1197, restored in the fifteenth century, has a new spire built in 1858.

The town house or *rathhaus* is of stone, the gable end is 51 ft. wide and 104 ft. high to the top of the pinnacles and dates at the end of the fourteenth century (best Middle Pointed, G. E. Street): a view is given in *BUILDER Journal*, 30th January 1869, and in VERDIER AND CATTOIS, *Arch. Civile*, 4to., Paris, 1855, i, 156, which 159 also gives one of the stone houses of the fifteenth century. The hall called the *Friedenssaal*, from the peace of Westphalia of 1648 having been signed in it, was fitted up 1575-7, and all the panelling, ceiling, fireplace, and other ornamental portions are of that date. "Perhaps a more beautiful example of a mediæval chamber of large size does not exist in Europe." It was elaborately restored 1853; a grand gothic hall added 1860-62, from the designs of Salzenberg, when the rathhaus was restored. There is also the exchange; the museum of ecclesiastic antiquities (Romanesque style), and a provincial museum; the house of assembly of the estates of Westphalia; a house of correction, two hospitals (one gothic 1856), and the schloss, the prince bishop's residence 1765-7, erected on the site of the old castle and now occupied by the commandant. WEBB, *Ecclesiology*, 8vo., Lond., 1848, p. 75. 14. 28. 50.

MÜNSTER (MEISTER HEINE), was employed 1487 on the choir of the Nicolaikirche at Wismar. 9.

MUNTIN and MUNNION (from the Fr. *Montant*), the middle vertical stile of an ordinary door, which has hanging and shutting stiles; also in framings where there are many stiles, the vertical ones are called muntins, as distinguished from the rails or horizontal portions of the framing. MULLION.

MUNTZ'S METAL. A patent was granted 22nd October 1832 to G. F. Muntz of Birmingham for "an improved manufacture of metal plates for sheathing the bottoms of ships and other such vessels". The composition was a mixture of copper and zinc, in the proportions of about 60 per cent. of the former to 40 per cent. of the latter; this was cheaper than copper, was more easily worked and lasted longer, being also sufficiently hard to allow of its being fastened to the sides of the ship with nails of the same composition. In 15th October 1846 he took out another such patent, enrolled 15th April 1847, using an alloy (CIVIL ENGINEER, etc. *Journal*, 1844, vii, 89, and 1847, x, 180) of 56 parts of copper, 40½ parts of zinc, and 3½ parts of lead, or other suitable metal: this on being cast into ingots is rolled into sheets while red hot and then annealed. The manufacture has been carried on since 1863 by a company. To ships cased with iron, a band of vitreous sheathing is attached for some distance below and above the water line,

in order to prevent galvanic action. This sheathing consists of small plates of iron covered with a preparation of glass, and is intended to be an antifouling as well as a protective agent. GWILT, *Encyc.*, edit. 1867, p. 669.

MUNTZ (J. HENRY), issued a long prospectus, dated 12th April 1760, entitled *Proposals for publishing by subscription a course of Gothic Architecture*, wherein the fundamental rules for the disposition, proportions, use, and antiquities of all the parts and members of that style of Building will be clearly stated, to be in folio with sixty or seventy plates: a copy of it is in the British Museum, Addit. MSS., Plut., 6771, clxxviii, C, fol. 215. He published, 8vo., Lond., 1760, a translation of CAYLUS, *Mémoire sur le peinture à l'encaustique*, etc., 8vo., Paris, 1755. His name, with "architectus", is placed to a plate of a "gothic cathedral", erected in Kew Gardens, in CHAMBERS, *Kew Gardens*, fol., Lond., 1763, pl. 29.

MUNYCHIA. One of the three ports of ancient Athens, situated between the Piræus and Phalerus, and by its acropolis, situated on the hill immediately above the most easterly of the two smaller harbours nearest to Athens, and rising 300 feet above the sea, protecting all. The fortifications were erected for Themistocles by Hippodamus of Miletus; or only the town regularly planned out by him for Pericles. They were destroyed by the Lacedæmonians 404 B.C., and having been rebuilt were again destroyed by Sulla B.C. 87. The sides of the hill appear to have been covered by houses; within the walls was a temple of Artemis Munychia; on the western side the Dionysiac theatre; a small circus, an agora, also two quarries of the soft shelly limestone so much used in the Athenian structures; and probably the remains of the tomb of Themistocles. CURTIUS, *De Portibus Athenarum*, Halis, 1842. HERMANN, *Disputatio de Hipp. Milesio*, Marb., 1841. 23. 28.

MURAD. An architect who repaired the castle of Galata after the great earthquake about 1490 which lasted seven days and nights, in the reign of Bayazid veli or Bajazet II (1481-1512). EVLIYA, *Narrative*, 4to., Lond., 1834-50, i, 70.

MURAL. Pertaining to a wall; as *mural arch*, an arch against a wall, frequent on the aisle walls of mediæval buildings; *mural monument*, a tablet affixed to a wall; and so on. *Mural painting* is a term embracing the various modes of decorating the surface of a wall, by painting in Fresco, Encaustic, Waterglass or Stereochromic method, Distemper, and Oil, which are treated in the separate articles: also under POLYCHROMY. THOMAS, *Mural or Monumental Decoration—with table of works*, 8vo., Lond. (1869). ARCHAEOLOGICAL ASSOCIATION *Journal*, iv, 91. DALY, *Revue Générale*, viii, 194, 242, 382, etc.: and xii, 11, etc. The publications referring to Pompeii, the Baths of Titus, Raphael's loggie, and those by Gruner: BLACKBURN, *Decorative painting applied to English Arch.*, 4to., 1847. COLLING, *Details of Gothic Arch.*, 4to., Lond., 1852-56. PETIT ET BISIAUX, *Motifs de Décoration*, fol., Paris, 1862-66. DALY, *Décorations intérieures peintes*, 2 vols., fol., Paris, 1875, in progress. PRIGNOT, *Décorations intérieures pour édifices publics et privés*, 75 photogs., fol., Paris. VIOLLET LE DUC, *Dictionnaire*.

MURANO. A town in Italy, situated on an island of its own name, the largest in the lagoons of Venice. It contains several remarkable buildings, besides the palace of Trevisano. The cathedral dedicated to SS. Maria and Donato, was erected in the ninth, and rebuilt in the twelfth cent.; the exterior of the apse is one of the richest specimens of the Lombard style; KNIGHT, *Eccles. Arch.*, fol., Lond., 1844, ii, pl. 3; BUILDING NEWS *Journal*, 1859, v, 924-6; SOMMERARD, *Les Arts du Moyen Age*, fol., Paris, 1838-46, ser. 8, pl. 8. Its plan is basilican, parallel triapsal. The nave, 32 ft. 8 in. wide, has six arches, each 8 ft. 2 ins. wide on each side; the aisles are 16 ft. 4 in. The church is mainly built of dark yellow brick, having others of a deep red for the decorative portions; all being of various sizes, thicknesses, and shapes to suit the work.

The pavement is waved and is a beautiful mosaic dated 1140, like that at S. Mark's, with devices of peacocks, etc.; it is noticed in RUSKIN, *Stones of Venice*, 8vo., Lond., 1858, ii, 30-55. The walls and ceilings also have very fine mosaics, a specimen of which is preserved in the dean's vestry at S. Paul's, London. The stalls run round the circular apse and behind the altar; in the apse is a large figure in mosaic of the Virgin. A very lofty detached campanile of four stages stands towards the south-west. The church of SS. Pietro ed Paolo or S. Pietro martire is a parallel triapsal church with an ancient shell much modernised. On the west front is inscribed "Iste conventus fund. fuit ex legato D. Marci Micael, obiit 1848." It has a large very thin campanile at the north-east, capped by a sort of depressed bulb. The church of Sta. Maria degli Angeli has a painted ceiling by P. M. Pennachi.

The Camaldolese (1210-1810) church of S. Michele di Murano on an adjoining island, was erected in the fifteenth century by Moro or Moretto. It is built of Istrian marble, and has a nave and two aisles. The hexagonal *capella Emiliana*, close to it, 20 ft. across, by G. di Bergamo, called Il Bergamasco, was finished about 1530, it is given in CICOGNARA, *Fabbriche*, fol., Venice, 1838, ii, 127, pl. 253-6. The buildings now belong to the Capuchins; one of the cloisters contains the great public cemetery of Venice; the inner cloister forms a square; a new cemetery has been added.

Murano acquired celebrity in the beginning of the thirteenth century, as the seat of the manufacture of Venetian glass, long regarded as the finest in Europe; coloured glass was first made there in 1436; coloured glass and beads are now chiefly exported. A collection of old glass manufacture is formed in the museum in the former bishop's palace. The old secrets were preserved from the twelfth century, but the art had been reduced to a bad condition, when from about the year 1859 a poor glass blower, Lorenzo Radi, applied himself to the improvement of the manufacture of enamel mosaics; his success attracted the attention of Dr. Salviati, a lawyer of Venice, and together they opened an establishment; they taught the workmen to execute for decorative purposes the cartoon reversed; the tesserae are fastened with paste to sheets of coarse brown paper, on which the cartoon is drawn. When completed, it has only to be fixed with cement on the wall or floor destined to receive it—in whatever part of the world it may be required: MOSAIC WORK. It is now largely employed in the restoration of ancient mosaic work, as at S. Mark's at Venice, La Martorana at Palermo, etc.; and from that establishment proceed fine glass manufactures of all kinds. He chiefly met with success in England; LAYARD, *On Mosaic Decoration*, read at Royal Inst. of Brit. Archits., 30th November 1868; quoted in THOMAS, *Mural Decoration*, 8vo., Lond. (1869), p. 100: BUILDING NEWS *Journal*, 1870, xviii, 34: BUILDER *Journal*, 1875, xxxiii, 1120: WEBB, *Ecclesiology*, 8vo., Lond., 1848, p. 309. MOSCHINI, *Guida per Pisola*, 8vo., Venice, 1808. 23.

MURATOIRES; MURII, MURARIE (B. BRAGERIO); Comacini magistri nunc muratori, and fabri murarii, architectura num sub Gothis corrupta, as noticed in MURATORI, *Rerum Ital. Script.* fol., Milan, 1739, ii, 349c, 353b: (Sp. *muradores*). Builders of stone walls, masons, or architects. See MURERER.

MURCIA. The capital of the ancient kingdom and of the modern province of the same name in Spain, situated on the river Segura, which divides the city, and over which is a good bridge of two arches, designed 1726 by T. Martinez de la Vega; the banks have quays on each side. The aqueduct was also designed by him and carried out by his two sons; it was finished 1794. In the brick walls of late erection are three principal gateways.

The cathedral dedicated to Nuestra Señora de Gracia, was built 1353-1462 and modernised 1521; portions of the interior are Gothic. The façade by Jayme Bort, is of the Corinthian order and Churrigueresque in style. SWINBURNE, *Travels*,

4to., Lond., 1779-87, p. 120, notices a chain carefully cut in stone round one part of the building; and there are others in the capillar de los Velez, the badge of the Molina family. The edifice suffered in the earthquake of 1829, when the façade, tower, and cupola were cracked. In it is the fine mausoleum of Alfonso X, king of Castile. The lofty belfry, begun 1522 but not completed until 1766, is in several compartments and finished by a dome; it is ascended by a spiral slope. Of the ten or eleven parish churches, S. Nicolas, S. Lorenzo, S. John, and S. Bartholomew, are the best.

In the plaza is the capacious episcopal palace, built 1752, one of the finest edifices of its class in Spain. The alcazar was fortified in 1495. The colleges of S. Fulgentius and S. Isidore form one range of building; the college of S. Leander is for music; the city contains many convents; a hospital of S. John for the sick with a magnificent staircase; another for convalescents; a post office and prison, both containing Moorish remains; a town house, custom house, an *almudi* or granary, and other civil and religious buildings, with a bull ring and a good botanic garden. LAHORE, *itin. Descr. de l'Espagne*; TOWNSEND, *Journey through Spain*; ENGLISH, *Spain in 1830*; COOK, *Sketches in Spain*. 14. 28. 50. 96.

MURDAN KHAN (ALI), a celebrated architect of Aurengzebe (died 1707), who erected for him the great bazaar at Cabul, esteemed the most spacious edifice and the chief seat of trade in Central Asia. It was 600 ft. long and contained 2000 shops; it took two days to reduce it to ashes, in Oct. 1842, after the insurrection had been put down by the English.

MUR D'APPUI. The French term for the thin wall frequently placed below the sill inside a window; in English, the window back; by some the sill is called the *appui*, and the wall the *allège*; *accouoir* is also applied to it, because it serves to lean upon in looking out of the window, and hence is called "leaning place" in England. 16.

MURDO, MORNO, MOROW, MORVO, or MURVO, perhaps originally Moreau (JOHN) of Paris, is mentioned in two inscriptions without date over a staircase doorway in the south transept of Melrose abbey, which are given in WADE, *History*, 8vo., Edinb., 1861, p. 29, 329-31, 383, from J. A. SMITH, in *Proceedings of the Society of Antiquaries of Scotland*, 1856, ii, 166: there is also a shield bearing three fleurs de lis and two compasses. They are considered to be not older than the fourteenth century, and may have been cut at some time after his death: Billings considers them to be of the fifteenth century: FORSTTH, *Beauties of Scotland*, 8vo., Edinb., 1805-8, dates it 1146. The longest inscription states that this person had the supervision of the cathedrals of Glasgow and of S. Andrew's, and of many churches and abbeys, Paisley abbey, and the ecclesiastical buildings of Nithsdale and Galloway, in the west and south of Scotland. MORTON, *Monastic Annals of Teviotdale*, 250.

MUREMIUM, see MERIMNIUM.

MURENA (CARLO), of Rome, was born 1713 and studied law, but having a strong inclination for architecture he became a pupil of N. Salvi, and was afterwards sent by his patron cardinal Barberini to L. Vanvitelli, who was then building the lazaretto at Ancona, and who seeing his proficiency entrusted him with the direction of those buildings to which he could not himself attend; those attached to the palace of Caserta at Naples he undertook entirely. His first work was the monastery for the Olivetine monks of Monte Morcino at Perugia, the church of which he personally superintended to its completion. He designed an isolated tabernacle for the cathedral at Terni: the church for the monks della SS. Trinità at Foligno: the rich Zampaj chapel in S. Antonio de' Portoghesi at Rome, which has many defects; in which city he also designed the very elegant sacristy to the church (restored by Vanvitelli) of Sant' Agostino (LETAROUILLY, pl. 157, p. 351): the fabric for the Cistercians, near Sta. Lucia della Chiaivica: the Bagni chapel in the church of Sant'

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Alessio; and the high altar of S. Pantaleo, completed miserably by another person: and the façade for Rochechouart, the ambassador of France, on the occasion of his being decorated with the purple. In 1760 he restored the palazzo Lante in the piazza de' Caprettari, designed by Sansovino and O. Lughli (plan in LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 349, pl. 153). He was suddenly seized with a malady, which caused his death in 1764, at the age of 51 years. 3. 12. 25.

MURERER. This name occurs in many places on the old walls of Chester, as "This part of the wall was repaired in the year, when" such and such "were murerers": some of the inscriptions are of ancient dates, even two hundred years old; as stated in *A Tour through Ireland*, etc., 8vo., Lond., 1748, p. 27. They were probably officers to whom the keeping the walls in repair was entrusted. MURATORIS.

MURHILL DOWN QUARRY. This quarry, situated near Bradford, in Wiltshire, supplies an excellent Bath stone, which has been used in several of the buildings at Gloucester, as the market house, the corn exchange, etc. For outside work, in projections, it is said to be the best weather stone of the Bath stones, being composed chiefly of shelly or flinty looking particles very equally disposed throughout. *Builder's Journal*, 1860, xviii, 805.

MURING. An old term for the raising of a wall. 4.

MUROM. A town in Russia, seventy-five miles south of Vladimir on the left bank of the river Oka. It is one of the oldest towns of Muscovy, and has a cathedral and sixteen churches, with only a population of about 4500.

MURPHY (JAMES CAVANAH), was originally a bricklayer at Cork, where his talents for drawing procured him patronage. He appears to have practised in Dublin in 1786, and was one of seven architects consulted on the additions to the house of commons, and the ultimate conversion of the senate house into the bank of Ireland (MULVANY, *Life of Gandon*, 8vo., Dublin, 1846, p. 116, 144). He left Dublin on 27th December 1788, for Portugal, with the assistance of the right hon. Wm. Burton Conyngham, to make for him *The Drawings of the Church and Monastery at Batalha*, which were published in 27 pl., fol., Lond., 1793-5 (the original drawings are in the library of the Society of Antiquaries), with a description by F. L. de Sousa, and an *Essay on Principles of Gothic Architecture*, by Murphy: who becoming well acquainted with the Portuguese and Spanish languages, held for a short time a diplomatic situation of importance. He also published *Travels in Portugal*, etc., in 1789-90, 24 pl., 4to., Lond., 1795, which contains his portrait, after a painting by M. A. Shee. He again left Dublin 8th October 1790, according to a diary in MS., now in the library of the Royal Inst. of Brit. Archit., which shows sketches made in Liverpool, Manchester, York, Cambridge, and London. In May 1802 he arrived at Cadiz, and was then preparing during seven years, with nearly seven years further work at home arranging, for the publication of (at the price of forty guineas) *The Arabian Antiquities of Spain*, the descriptions by T. H. Horne, in 110 plates, fol., Lond., 1813-16. This work he did not live to see completed, as he died in London, 12th September 1814. *A History of the Mahometan Empire in Spain*, 4to., Lond., 1816, was published as auxiliary to that work. CROKER, *Researches*, 4to., Lond., 1824, p. 204, notices that he left a large collection of notes and drawings showing the minute and careful manner in which the particulars of every object were detailed. DIBDIN, *Library Companion*, 8vo., Lond., 1824, i, 310. W. P.

MURRAILLES PLEINES. Unwrought walls, the flat surfaces between paneling.

MURRAY (JAMES), succeeded 1602 to W. Schaw, as master of the king's works in Scotland. He was directed by the privy council of Scotland, 22nd May 1616, to do sundry specified works at Holyrood house; to take down the old entry to Stirling castle, and use the materials in repairs; to

take down the king's and queen's galleries in Falkland, and other repairs, according to the warrant given in NICHOLS, *Progress of James I.*, 4to., Lond., 1828, iii, 308. He held that position in 1628, the year in which Heriot's hospital was commenced; and in 1617, he tested William Wallace's capabilities for the office of master mason to which he was appointed. Murray succeeded by Robert Milne, in December 1631. But in 1633 he had a payment made to him of £1000 scots, for the drawing up of a "modell" of the parliament and sessions house in Edinburgh, and for other services. It was probably carried out by John Ritchie, who was appointed 1633, by the town, master mason of the new parliament house; MYLNE, in *Sessional Papers*, Roy. Inst. of Brit. Architects, 1861-62, p. 57, from the city treasurer's accounts.

MURRAY (JAMES). He was born 9th December 1831, at Armagh, was articled 1845 to W. Scott of Liverpool: and on leaving the office commenced practising with T. D. Barry of that town. When the partnership was dissolved, he took the share of the business at Coventry and settled there. Having removed to London, he, in connection with the late E. Welby Pugin, executed several works there and on the Continent. Dissolving this partnership he returned to Coventry. Amongst his works, in addition to those made during the above undertakings, are the justice rooms, and corn exchange at Coventry 1856, the largest room of the kind (*BUILDER Journal*, xiv, 346), that of Banbury 1857 (*idem*, xv, 693), and at St. Alban's 1853: churches at Warwick, Boulton, Sunderland, Newcastle, S. James at Stratford-on-Avon, Emscote, Birmingham, and Stortford: 1857-8 a Gothic warehouse for Messrs. Bennoch, in Silver Street, London; and a mansion for alderman Gabriel, not completed at his death. He published *Modern Architecture; ecclesiastic, civil, and domestic; Gothic and Classic Buildings erected since 1850*, part i, 4to., Coventry, 1862. He died at Coventry, 24th October 1863, aged 32 years, and was buried in the cemetery according to the rites of the Roman Catholic church. *BUILDER Journal*, 1863, xxi, 780, 807.

MURRAY (MARK), 1803-5 rebuilt the steeple of the cathedral of S. Columba at LONDONDERRY, as the old one had given way under the timber spire erected 1776: he also 1825 thoroughly repaired that building: and effected improvements at S. Stephen's chapel, Dublin.

MURRAY (WILLIAM), was architect to the board of works in Ireland; he designed the lunatic asylum at Limerick 1824-26, in conjunction with — Johnson; 1825 the front and enlargement of the royal college of surgeons in College Green, Dublin, erected 1806, by E. Parke (WRIGHT, *Ireland*, 4to., Lond., 1831, p. 58); superintended 1827-9 the lunatic asylum at LONDONDERRY, from a design by F. Johnston of Dublin; with — Denny designed 1850 additions to the Richmond lunatic asylum at Dublin; and as architect to the Dundalk and Enniskillen railway, he designed at the end of 1859 the terminus at Enniskillen, and perhaps other stations on the line, as noted in *BUILDER Journal*, 1860, xviii, 46. He died 6th March 1871.

MURRAY'S COMPENSATING BALL LEVER. An invention registered at end of 1849, to obviate the inconveniences attending the old ball taps to cisterns. It consists of a ball divided into two chambers, one above the other, the upper one being air tight to act as a permanent float: the lower one has a small opening close under the division, for the admission of water or air, either to form a weight or a float. Thus when the ball is up and the supply shut off, the lower chamber will be full of water, to exert the power of a weight equal to 3 lbs., in the case of a ball 6 in. diam. to turn on the service; and if the water level fall below the ball when in a vertical position, the water would run out, and it would regain the whole buoyancy of an ordinary ball of that size.

MURRAYA. A strong tough close-grained wood, called *maikay*, of Travancore and Tavoy, East Indies, weighing 60 lbs. 13 oz. per cubic foot.

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MURRO (Sébastien), of Colmar, priest and canon, had no equal in architecture, music, or any other art; he died 1495, according to his epitaph, given in TRILHEM, *Catalogus Illustrum*.

MURUS, ΜΕΝΙΑ (τείχος). The Latin term for the wall of a Greek city, in contradistinction to *paries* (τείχος), the wall of a house, and to *Maceria*, a boundary wall. Murus and τεῖχος are also used for the outer wall of a large building. 78.

MUSAIC, see MOSAIC WORK.

MUSCOVY GLASS. In 1660, Muscovy glass or slude was sold by the pound; GLAZIER, p. 50.

MUSCULAR STRENGTH; see MAN, power of a.

MUSEMECI (MARIO), also an archæologist, was born 1773 at Catania. Having received a sound literary education, he studied architecture, taking for models the monuments of antiquity: his first works were the provincial prison and the cloisters of the celebrated Benedictine monastery at Catania; in 1820 he was appointed engineer of roads and bridges; and in 1829 professor of architecture in the university there. His writings are collected in *Opere Archeologiche ed Artistiche, di M. M.*, 2 vols., 8vo., Cat., 1845-51. He died at Catania, in 1852.

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MUSES. The patronesses of the liberal arts. In very ancient works three muses are found — Mneme, or memory; Melete, or meditation; and Aoidē, or song; their attributes being musical instruments, as the flute, lyre, or barbiton; it was not until the more modern ideal of Apollo Musagetes in the garb of a Pythian musician was developed that the number nine was established. It has been stated that a sculptor of Sicily misunderstood an order for three statues of the muses for the temple of Apollo, and made three of each; whence having been all set up, the nine came to be reckoned, whom Hesiod afterwards named. A relief on a sarcophagus in the Capitoline gallery at Rome, represents the nine muses standing: by the help of this, and by the description in AUSONIUS, *Idyl* 20, it has been attempted to distinguish them one from another. The front of a sarcophagus, 7 ft. 6 in. long, and 2 ft. 6 in. high, in the British Museum, exhibits them beginning with Clio; it is figured in MOSES, *Collection of Vases*, etc., 4to., Lond., 1811, pl. 131: in the SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE, *Townley Gallery*, 8vo., Lond., 1836, ii; and in WESTROPP, *The Traveller's Art Companion*, 8vo. Lond., 1863, p. 191. The second named work, ii, 118-30, illustrates the apotheosis of Homer, having the muses thereon, also from the same collection; and some separate statues of the muses. The work by MOSES also gives, pl. 135, a *sarcophagus from the musée Napoléon*, also showing these figures, which were sometimes depicted dancing, probably to intimate the near and indissoluble connection between the arts and sciences. MILLIN, *Galerie Mythologique*, pl. 19-23. See also MYTHOLOGY.

1. *Clio*, with a roll or book, or with the longer bolder pipe; her office to celebrate the actions of departed heroes. 2. *Thalia*, with a comic mask in her hand and a pastoral crook, and a wreath of ivy—the muse of comedy and pastorals. 3. *Terpsichore* has nothing to distinguish her; Ausonius gives her the cithara, a stringed instrument. 4. *Euterpe*, with two pipes played on at once; sometimes holding the fistula or calami; presided over music. 5. *Erato*, represented either pensive or full of gaiety, presided over the amorous kinds of poetry. 6. *Calliope*, with tables in her hand to note the worthy actions of the living, the chief of the muses (OVID), and as skilful on all instruments. 7. *Polyhymnia* or *Polymnia*, the muse of the sublime hymn, leaning in a pensive attitude, has some stringed instrument in her hand. 8. *Urania* is distinguished by a celestial globe at her feet, and the radius in her hand: in statues the globe is sometimes placed in her hand, or on a column before her: she presided over astronomy. 9. *Melpomene* has a mask on her head, sometimes placed very far back, looking like a second face (MONTFAUCON, i, pl. 59),

she presided over tragedy, and melancholy subjects of all kinds. The palm tree, laurel, and all the fountains of Pindus, Helicon, and Parnassus, etc., were sacred to the muses. They are also found arranged in the following order, 1, 8, 6, 4, 5, 2, 9, 3, and 7: also 6, 1, 4, 9, 3, 5, 7, 8, and 2. Herodotus has assigned their names to the books of his history. 6. 13. 14.

MUSEUM. A building for the accommodation of objects for the purpose of study, as of art, of science, of archæology, of NATURAL HISTORY, of books and manuscripts (LIBRARY), or of pictures (PICTURE GALLERY). Objects of manufacture now often form a museum of themselves, as do other articles when associated together for a specific purpose, as in Industrial museums, etc.

This term, which means strictly a study or place of retirement, was originally applied to a part of a palace founded by Ptolemy Philadelphus, at Alexandria in Egypt, which part was so denominated in consequence of its being reserved for the muses and the study of sciences. Men of learning were lodged and entertained in it, and divided into companies or colleges according to the sciences of which they were professors: a handsome revenue was attached to each establishment. The buildings were afterwards enlarged by the emperor Claudius. It is now more widely applied as above.

In a museum the plan should be carefully studied and arranged with reference to the character of the objects to which it is to be devoted, so that the general distribution of such objects should assist the purposes of study, by presenting chronology or style in art, the scientific relations of objects of natural history, the development and connection of manufactures, in a proper, orderly and distinct series, grouped with reference to their true artistic or philosophical relations.

"It is obvious that such an arrangement as that of the British Museum is only perfect as it is limited; those who conceive the formation of a museum, which shall represent the sciences, arts, and manufactures of a district, of a nation, or of the universe, should consult the 'Classification of subjects in the thirty classes into which the Exhibition of the Works of Industry of all Nations, 1851,' was divided. It is placed at the commencement of the volume containing the reports of jurors, and should be carefully scrutinised, as experience has already shown the difficulty of satisfactorily making such classifications.

"The determination of the extreme size of the objects which are to be received into the collection is of the highest importance, as it involves the question of the absolute weight upon some of the floors, and consequently affects the stability of the structure: besides, if too low a standard be adopted, it may be found impossible for a large yet light object to enter either at door or window. Probably there is nothing in the upper floor of the British Museum so tall as twenty feet, which may be quoted as the height of that floor: if by accident some object still taller were obtained, it might be placed under the lantern light; fourteen feet in the clear at the walls is a sufficient height for buildings of moderate pretensions. The question of a foot more in the height would not at first seem of importance in the consideration of a gallery, but regarded as the addition of at least a fifteenth of the cost of the walls for every foot in height, it is really an essential item in the cost of the building; and many galleries might be crippled in other features by an extravagance of this sort, when the funds are either not too large for the proper commencement, or unlikely to procure in future any object that would justify the original fault." There are objects that can only be well viewed or appreciated by being seen at a considerable height, although they may not be themselves of great height: such as statues, vases, etc., intended to be placed in a lofty position.

"The extent of accommodation for each department decides the number of rooms which are to be provided for the museum, and must considerably influence the general design; because when the collection is meant to be multifarious and does not

yet exist, the only means of escaping from difficulty is to require a series of rooms perfectly alike, and either of such moderate dimensions as to be easily divided among the classes, or of such sizes as to admit of future subdivision. As one element for calculation, the architect may assume that the presses or cabinets will never be less than eighteen inches deep, that is to say, he may judiciously add three feet to the width he may require for the apartments which are to contain such cabinets or cases. Two other points may be made useful in preventing difficulties in a large museum; viz., the construction of the wall-cases separately, in uniform lengths (say of four feet) such as can be readily moved; and the constant use of such a system of lighting from the roof as will at intervals allow of partitions being made which will admit one or more such lengths of cases. In this way an increasing museum with small funds for building may be commenced, and extended on a systematic plan; no business can be economically transacted in a museum where either the collections of each department are scattered; or where the specimens in any branch of a department are not kept together: unfortunately, these faults exist in some of the most highly-praised museums.

"It is submitted, as a constant result of experience, that a museum for a provincial town should not be without a lecture-room: its utility at the Museum of Economic Geology is self-evident, and the noble apartments of the British Museum would amply suffice for the purpose; but the utility of a theatre is, perhaps, greater in proportion when attached to a small collection, than when part of a large one, because the best means of ensuring the permanent and successful establishment of a museum appears to be the employment of some system of lecturing." PAPWORTH, *Museums, Libraries, and Picture Galleries*, 8vo., Lond., 1853, p. 13-16.

To name all the museums, or the best of them now existing, would be needless, as every capital and almost every provincial city and town, especially on the continent, possesses one: but the following should be especially mentioned:—ROME, the Vatican, the Capitol, the Lateran; BERLIN; TURIN; PARMA; MANTUA; PAVIA; MILAN; PADUA; NAPLES, the Studii; FLORENCE the Uffizi; LEIPZIG, the Schlettur collection; MUNICH; DRESDEN; PARIS, the Louvre; S. PETERSBURG, the Hermitage, and New museum; LONDON, the British museum, the South Kensington museum; OXFORD, the Ashmolean, and the University museums; CAMBRIDGE, the Fitzwilliam; and those at EDINBURGH and DUBLIN.

WARING, *Account of the Provincial Museums of France*, in *ARCHITECT Journal*, 1872, viii.

MUSHREBEEH. One of the ways of spelling MASHARABEEYEH.

MUSIC HALL. A room devoted to musical entertainments, or a hall erected for some other special purpose, but sometimes used for assemblies and musical purposes. In London, the older places of the sort were called "saloons", of which the oldest, the British saloon in Southwark Bridge Road, was opened in 1840 afterwards called the Grand Harmonic Hall, in 1851 Surrey Music Hall, and when the large building was opened 1856 in Surrey Gardens, it took the name of Winchester music hall. The history of these popular places of amusement dates from 17th May 1852, when Charles Morton opened the Canterbury hall, Lambeth.

For the *Handel Commemoration Festival* at the Crystal palace in 1859, the company published a plate of *comparative dimensions of the principal orchestras of the country*, giving the areas but not the sizes. The central transept was considered as 360 ft. long by 216 ft. wide; the orchestra being enlarged to 216 ft. wide and 100 ft. in depth in the centre, to hold nearly 4000 performers. For the *Great Triennial Handel Festival* in 1862, the company on putting a roof over their orchestra, on walls 60 ft. high and 100 ft. at the centre, published a plate of *Sections of roofs of various cathedrals, music halls, etc., used for great musical festivals*, but without dimen-

sions or scale; and it is stated that the Birmingham Town hall is one of the very best buildings for music in this country.

LIST OF SOME MUSIC HALLS AND ROOMS.

| | | length. | width. | height |
|---------|--|---------|--------|-----------------|
| | Newcastle-on-Tyne | 147 | 60 | 46.6 |
| | Manchester, Free Trade hall ... | 176 | 104 | 70 |
| | Berlin, Concert room in Schauspielhaus, | | | |
| | 1200 persons | 56 | 44 | 13 |
| | " Opera house | 100 | 50 | 20 |
| 1872 | Boston, U.S., The Jubilee hall; 11,000 | | | |
| | vocalists, 1050 instrumentists, | | | |
| | 25,000 to 30,000 audience ... | 550 | 270 | 40 walls |
| 1852 | " Music hall, 2700 persons ... | 130 | 78 | 65 two galls. |
| | Aberdeen, New Music hall (<i>B. J.</i> , xvii, 635) | 150 | 68 | 50 |
| 1856 | Coventry, Corn Exchange (<i>B. J.</i> , xiv, 346) | 110 | 55 | 40 |
| | | | 74 | across galls. |
| 1855 | Birmingham, Music hall (<i>B. J.</i> , xiii, 152; | | | |
| | xiv, 293), 1840 persons ... | 111.6 | 76 | 70 two galls. |
| | Gothic of 14th cent. ... | 76 | 50 | on floor. |
| | Leeds, Town hall (<i>B. N.</i> , iv, 911) ... | 162 | 72 | 75 |
| | Liverpool, Philharmonic hall ... | 135 | 112 | 65 |
| | open part, 2300 persons ... | 106 | 68 | |
| | " Music hall, 2300 persons (<i>B. J.</i> , | | | |
| | iv, 477) | 175 | 112 | 65 ext. |
| 1856 | " S. George's hall (<i>B. N.</i> , ii, 615) | | | |
| 1856 | " Concert room (<i>B. J.</i> , xiii, 594), | | | |
| | 1100 persons | 77 | 72 | 37 oval |
| | Recess behind | 30 | 30 | 20 |
| 1861 | Harrogate, Cheltenham Pump room (<i>B. J.</i> , | 86.6 | 33 | 22.7 walls |
| | xix, 469, 578) | | | 24.2 to centre. |
| 1861 | Edinburgh, University (harmonic propor.) | 96 | 48 | 32 |
| 1856 | London, Surrey Gardens (<i>I. L. N.</i> , xxix, | | | |
| | 67, 69; HUBNER, <i>Prog. of</i> | | | |
| | <i>Mod. Eng.</i> , 1863; 13000 per. | 153.6 | 68.6 | 69.6 |
| 1851-3 | " Alhambra (formerly the Panop- | | | |
| | tion) | 98 | diam. | 95 |
| | " S. Martin's hall (now theatre) ... | 121.6 | 55.5 | 40 |
| 1847-50 | " Buckingham palace, ball room ... | 110 | 60 | 45 |
| 1830-1 | " Exeter hall, 3000 persons ... | 138 | 76 | 51 |
| 1763-7 | " Willis's rooms | 100 | 40 | |
| 1856-8 | " S. James's hall | 129 | 59 | 59.6 |
| 1867-70 | " Albert hall, 8000 persons, 1500 | | | |
| | chorus, and 300 musicians ... | 320 | 308 | oval |
| | Bradford, S. George's hall | 152 | 76 | 60 |
| 1858 | Scarborough, Music hall (<i>B. N.</i> , iv, 618, | | | |
| | 957, 1036) 2000 persons ... | 98.6 | 57 | 44 galls. |
| 1859 | Malvern Link (<i>B. J.</i> , xvii, 684), 300 pers. | 45 | 24 | 17 |

MUSIC ROOM. Such a room is sometimes constituted by placing an organ in an ante-room, or in a saloon or gallery, whereby the apartment is in a manner identified with musical performances of a more pretentious character than those of the pianoforte in the drawing room. But there is no sufficient reason why the name should be applied in any such case, or in any case at all, unless the apartment is to some extent specially constructed for acoustic purposes. So far as regards mere form, there may be said to be no necessity for improving much upon the model of an ordinary apartment. The acoustic aid to be given to such a room is that the height, breadth, and length should be in exact harmonic proportions, such as 2, 3 and 4 for example, respectively; say perhaps the height 16 ft., the width 24 ft., the length 32 ft. Theorists suppose that by this means a harmonious concordance of sounds is secured; a mere approximation to such proportions, however, is said to be worse than a total disregard of them: and the room must on no account be comparatively lofty, as this allows the sound to be lost in the waste space above. To prevent reverberation, the ends will perhaps be best if curved, plain blank side walls are to be avoided; the ceiling plain or slightly panelled, and to be coved. The walls and ceiling will be better for being lined with boarding rather than with plaster; this producing resonance, constitutes the room itself to a degree a sort of musical instrument. The floor should be covered with a soft and absorbent material, such as carpet or matting; or the room must be well filled with an auditory to serve the same purpose. These appear to be

simple principles readily available; and doubtless much is to be done by means of their application towards making an ordinary room acoustically efficient: KERR, *Gentleman's House*, 8vo., Lond., 1865, p. 114, 186-7. **HARMONIC PROPORTION.**

The concert room by C. R. Cockerell, at St. George's hall, Liverpool, has been much praised by vocalists for the ease with which they can sing in it; and Miss Stephens used to speak highly of the room in the Shire hall at Perth, designed by Sir R. Smirke. At Cliefden house, near Maidenhead, is an elliptical music room further described *s.v.* ELLIPSE.

MUSIVUM OPUS, or glass mosaic; see **MOSAIC WORK**.

MUSK WOOD, see **EURYBIA ARGOPHYLLA**.

MUSLIMATU BEN ABDALLAH, see **BEN YOUNAS (A)**.

MUSNIER (.....), directed the works at Moulins cathedral 1508; RAMÉ, *Hist. de l'Arch.*

MUSONIUS, is mentioned in *Anthol. Gr. Palat.*, 9, 677, ii, 238. **SILLIG**, *Artists of Antiq.*, 8vo., 1836.

MUSSELL. This word appears to have been applied to a measure for plaster, its size being 4 ft. 6 in. high, 2 ft. diam. at top and 3 ft. at bottom, as noted in the "Memorale Henrici prioris (1285-1331) monasterii Cantuariensis", MS. in British museum, Galba, E, iv, fol. 28 b.

MUSSEL BRICK, properly called **MINGLE BRICK**. In the eastern counties of England, in places where bricks are made from gault clay, they obtain three names, as representing three qualities and prices: viz. (1) *Best whites*, those which, being in the middle of the kiln, receive the most intense and uniform heat; they are specially reserved for the best quality of facing bricks; (2) *Seconds whites*, those which in the kiln immediately surround the best whites, but do not receive such good firing; they are used for garden walls and second-rate buildings; (3) *Mingle bricks*, those next the walls of the kiln; they receive heat enough to burn them hard, but not to make them white; they are used for foundations or internal walls, they are not proof against frost. R. R. R.

MUSTIUS. One of the friends of the younger Pliny, and employed by him to rebuild a temple to Ceres on his estate, and perhaps in some of his undertakings; **PLINY**, *Epist.*, ix, 39. **SILLIG**, *Artists of Antiq.*, 8vo., 1836. 25. 59.

MUTILATED BASE. Such a one is seen to the pilasters of the covered galleries on the garden side of the Tuileries, profiled on the sides but not on the face; **VIRLOYS**, *Dict.*, *s.v.* Base. 5.

MUTILATED CORNICE. One that is broken or discontinued. 1.

MUTINA. The Latin name of **MODENA**, in Italy.

MUTIUS or **MUCIUS**, or **Mutius Cordus (CAIUS)**, of Rome, living about 104 B.C. (or who flourished in the first age before Christ), completed the cell, columns, and entablature of the temples to Honour and Virtue, near the trophy of Marius; **VITRUVIUS**, vii, preface, who praises the work, and regrets it was not of marble. He was also employed about 65-51 B.C., with Menalippus to repair the Odeum at Athens, injured in the siege by Scylla, A.C. 85. A comparison of several MSS. in the British Museum gives the following readings of the name, and the error of certain works being attributed to Hermodorus, in **VITRUVIUS**, iii, 1, as noticed herein *s.v.* **HERMODORUS**. 3. 5. 25.

| | | | | |
|------------------------------------|--------------------|----------|--------------|-----------------------------------|
| 1st cent.; The MSS. Harl. 2767 has | statoris | hermodi | et.....mucio | facta. |
| 15 " | 2508 — | statoris | hermodi | et.....mutio |
| 15 " | 2760 — | statoris | h'modi | et.....mucio (here |
| | | | | h' means hujus, as below). |
| — | 3859 — | statoris | hermodi | et.....mucio |
| 15 " | 4870 — | statoris | h'modi | et.....mutio (the |
| | | | | writer did not know what to put). |
| — | Cott. Cleop. D 1 — | statoris | hermodi | et.....mucio |
| — | Arundel 122 — | statoris | hujusmodi | et.....mutio |

MUTATION. The variations in point of taste, ability, or style, which the course of years produces in all the various departments of art. 6.

MUTI (Marchese GIOVANNI BATTISTA), designed 1664 the palazzo Muti dei Papazurri in the piazza dei SS. Apostoli at Rome: the elevation is given in FERRERIO, *Palazzi di Roma*, fol., Rome (1655).

MUTONE (CARLO) of Lombardy, designed 1667 the church of Sta. Croce; and decorated the façade of that of S. Luca, both at Genoa. *Manuale — di Genova*, 12mo., Genoa, 1846, p. 49, 86.

MUTTRA or MATHURA. A town in the province of Agra, in Hindostan, situated on the river Jumna. Its erection is of early date, and having been destroyed 1018 by Mahmood of Ghizni, it was subsequently rebuilt, with several temples, the most magnificent of which was erected by rajah Beer Singh Deo of Oorcha, at a cost of thirty-six lacs of rupees (£360,000). This edifice was razed by Aurungzebe who erected a mosque on the site with the materials. In the fort are the remains of an observatory built by rajah Jeysing or Jeypoor or Jyenagur. There is another and larger mosque ascribed to Abdulla Nubbee khan; also a dwelling and temple built by Gool Paruk, treasurer to the late Dowlut Row Sindia. Although the remains are generally of no great magnificence, several of the pagodas surpass those of the Carnatic in elegance, and the galleries of the ghauts are striking and curious. HAMILTON, *Gazetteer*, 1828. Photographs of a street, and the great mosque, in MURRAY, *Scenes of the War*, fol., Lond., pl. 23-4. A view of the town, in DANIEL, *Oriental Scenery*, fol., Lond., 1801, pl. 22.

MUTULE (Lat. *mutulus*). A projection in the cornice of most examples of the Doric order placed over each triglyph and over each metope, as a sort of capping, and to carry the projecting portion or corona of the cornice. The French writers by naming the mutule *console plate*, appear to hold the doctrine that a cantilever, if plain, should be called *corbeau*, but if decorated *console*. The mutule has always been assumed to be an imitation of the end of a timber rafter; and in most, if not all of the ancient examples the inclination of the under side of the mutule is the same as that of the pediment: DONALDSON, in STUART, *Athens*, etc., fol., Lond., 1830, iv, 11, when describing the temple at Bassæ, remarks that "it is a curious fact, that the soffit of the mutule never follows the rake of the pediment"; the word "never" is probably a misprint for "ever", as the plate shows that it does slope in that example. Some of the architects of the Revival make the mutule level; it is commonly made of the same breadth as the triglyph; and is ornamented on the underside with guttæ or drops of various forms. The temple to Hercules at Cora exhibits a continued row of level drops. The temple to Ceres at Pæstum has no mutules or triglyphs. The example at Albano has no intermutules. At the temple at Myus, at the hexastyle temple at Pæstum, and at the temple to Marcellus, there are no mutules, but the usual guttæ under the triglyph; *Ionian Antiq.*, ii, pl. 35; this is Myus of Chandler, which is Heraclea, near Miletus, as stated by DONALDSON, in STUART, *Bassæ*, iv, note, p. 11, 13, and 35. No mutule and no guttæ occur under the triglyph in the triple arch at Patara, but a chamfer; SOCIETY OF DILETTANTI, *Ionian Antiq.*, fol., Lond., 1840, iii. In the principal temple at Selinuntum, the heavy entablature has a very remarkable peculiarity, the mutules over the metopes being only half the width of those over the triglyphs, and containing only half the number of guttæ: ANGELL, *Temples*, fol., Lond., 1826, p. 33. *J. W. P.

BLOCK CORNICE. BRACKET. CANTHERIUS. CANTILEVER. CONSOLE. CORBEL. GARGOYLE. GUTTÆ. INTERNUTULE.

MUZIANO (GIROLAMO), born 1528 at Acquafredda, near Brescia, was a painter in oil and fresco, and superintended the Roman mosaic works, bringing them to great perfection. As an architect he designed the capella Gregoriana, or the chapel of pope Gregory XIII, in S. Peter's at Rome; and the foundation of the academy of S. Luke in that city is due to him. He died at Rome in 1590 or 1592, and was buried in the church of Sta. Maria Maggiore. 14. 38.

ARCH. PUB. SOC.

MUZZARELLI, an error in some works for MAZZARELLI (F.)

MYA-KAMAUN. A valuable strong black wood of Tavoy, East Indies. 71.

MYAUN-NGO. A wood of Amherst, East Indies, used for rafters. 71.

MYA-YA. A hard, close-grained, durable wood of Amherst, East Indies, not attacked by insects. 71.

MYCENÆ. An ancient town in Northern Peloponnesus, near the modern village of Karbata or Kharvati, about sixteen miles from Corinth. It was founded by Perseus, B.C. 1300, was the capital of Agamemnon, and was destroyed by the Argives after the Persian war, B.C. 466. It stood on a rugged height, in a recess between two loftier eminences; and was defended by a citadel, the entire circuit of which is still visible; with walls about 1200 ft. by 600 ft., in some places from 15 to 20 ft. high, which except at intervals are of the oldest style of Cyclopean architecture. They are described by PAUSANIAS, ii, ch. 15-6. On the summit of the hill are openings to subterraneous cisterns or granaries built of large stones and lined with plaster. The gate of lions (LION), and the back of it, being the entrance to the acropolis, is formed of two upright jamb stones 17 ft. high, supporting an entablature 15 ft. long, 6 ft. 6 in. thick, and 4 ft. deep in a single block, on this is a triangular slab 10 ft. high, 12 ft. long, and 2 ft. thick, carved with two lions standing; this together with the acropolis itself; the small gate of it; the so-called treasury of Atreus, inside and out; and the portal to another of the treasuries, are all given in DODWELL, *Cyclopean Remains*, fol., Lond., 1834. The acropolis, treasury, and gate of lions, are given in GAILHABAUD, *Monuments*, 4to., Paris, 1842-52, i. The treasury is outside the walls and about fifty yards from the gate, and has an entrance larger than the gate of the lions; it is a large vaulted chamber of uncemented stones and of a conical form, with horizontal beds, 48 ft. 6 ins. at the base, and about 45 ft. high; adjoining this is an interior chamber of square form and smaller dimensions. It is called the tomb of Agamemnon by DODWELL and CLARKE: and was carefully measured and delineated by DONALDSON, in STUART, *Antiq. of Athens*, fol., Lond., 1830, Supp. vol. iv, who states that the interior was covered with thin plates of copper fixed by metal nails (Æs); and gives other remains: he states that the entrance is covered by two stones, the inner one of which is 26 ft. 10 ins. long, 16 ft. deep, and 3 ft. 10 in. thick, calculated by DODWELL at 133 tons: the edifice is also illustrated in BLOUET, *Morée*, fol., Paris, 1834-36, ii, pl. 63. A temple to Juno, burnt B.C. 423, near the town was erected (?) by EUPOLEMIUS.

GREG, in *Memoirs of the Literary and Philosophical Society of Manchester*, 1842, printed in CIVIL ENGINEER, etc., *Journal*, 1842, v, 217. GELL, *Morea*, 8vo., Lond., 1823; W. G. CLARKE, *Travels*; LEAKE, *Topography of Athens*, etc., 8vo., Lond., 1821; and *Travels in the Morea*, 8vo., Lond., 1830, ii; and *Tour in Asia Minor*, 8vo., Lond., 1824; CHANDLER, *Travels*, 4to., Lond., 1817. HUGHES, *Travels*, 8vo., Lond., 1830, i, 197; DODWELL, *Tour in Greece*, 4to., Lond., 1819; DUDLEY, *Næology*, 8vo., Leicester, 1846, p. 341; FERGUSON, *History*, 8vo., Lond., 1868. SCHLIEMANN, *Ithaka der Peloponnes und Troja*, 8vo., Leipzig, 1869, p. 88. 14. 50. 28.

Cos, in the island of the same name, in the Myrtean sea, is only remarkable for the passage and chamber of the fountain of Hippocrates, given in TEXIER, *Asie Mineure*, fol., Paris, 1839, ii, 133, on account of the curious resemblance to the work at Mycenæ.

MYCERINUS, the sarcophagus from the third pyramid at Gezeh, and lost on its way to England, represented a palace with all the peculiarities found on a larger scale in the buildings which surround the pyramid, with the peculiar cornice and still more peculiar roll or ligature on the angles, most evidently a carpentry form, but which the style retained to its

latest day. A cut of it is given in FERGUSSON, *Handbook*, 8vo., Lond., 1855, i, 222. EGYPTIAN ARCHITECTURE.

MYENG-TA-BEP. A strong bluish-grey wood of Tavoy, East Indies. 71.

MYLAM'S CEMENT, patented 1844; see SERCOLLANE.

MYLASA or MYLASSA; the modern MELASSO. A town near Boodroom in Asiatic Turkey. It is of considerable size, but the houses are generally mean. It contained at one time a great number of temples, and still exhibits numerous remains of antiquity. VITRUVIUS, ii, 8, notices that Mausolus was born there. DILETTANTI SOCIETY, *Ionian Antig.*, fol., Lond., 1797, ii, pl. 22-30, gives a single Corinthian column to Menander, son of Vulcades, near the temple of Rome and Augustus; also the semi-columns back to back with a small pilaster between them like those at Delos; an arch; and also the most interesting tomb, in form something like the free standing rock-cut examples at Jerusalem. It consists of a square base of stone which supports twelve columns, eight of which support a dome, which is constructed in the same manner as are all the Jaina domes in India, and though ornamented with Roman details, is unlike anything else ever built by that people, etc.; FERGUSSON, *Handbook*, i, 354, with a woodcut. The above-named temple was destroyed in the middle of the eighteenth century by the Turks, who built a mosque with the materials; POCCOCKE, *Travels*, ii, 2, c. 6. CHOISEUL-GOUFFIER, *Voyage Pitt. de la Grèce*, fol., Paris, 1782-1809, i, pl. 83-92. AQUE-DUCT. 14. 23. 25. 50.

MYLASSENSE MARMOR. A species of marble so called by the ancients, dug near a city of that name in Caria. It was of a black colour, but with an admixture of purple, not disposed in veins, but diffused through the whole mass. It was much used in building among the Romans. 13.

MYLE ELLA. A wood of Travancore, East Indies, of an ash colour, used for carts, building, etc. Another of a light green colour is used for building houses only. 71.

MYLNE (JOHN), who is known as the first of the family, was appointed about 1481 master mason in Scotland by king James III, who granted him a coat of arms, given in NISBET, *Heraldry*, fol., London, 1722, i, 127; and in NOTES AND QUERIES *Journal*, 3rd ser., vii, 198. ALEXANDER, his son, was master mason to the king. THOMAS, his son, was master mason to the king.

MYLNE (JOHN), his son, mason, came from the "north country" to Dundee, afterwards settled at Perth, "and in process of time by reason of his skill and airt, was preferred to be the kings ma'ties mr. meason, and master of the lodge at Scone". Subsequent to 1580 he was engaged on the harbour, on several public works, and designed the market cross, all at Dundee, and the stone pier at Newport opposite; 1587 contracted with George Thomson, mason, to build lord Bannatyne's house at Newtyle, portions of which still exist; 1599 went to Perth in reference to the proposal for erecting a stone bridge of eleven arches across the river Tay, to which work in 1604 "he entered as master mason to the brig of Tay"; in 1610 his son, another JOHN, assisted his father in completing that work, and cutting and fixing on it the royal arms in 1616: it was destroyed in 1621 by an unprecedented flood from a sudden melting of snow, and was not replaced; the present bridge of seven arches was built 1770 by J. Smeaton, over a broader part of the river. He entered king James VI (1567-1603-25) as "frieman meason and fellow-craft" at his own desire, of the lodge of Scone. He died in 1621, and was buried in the Grey Friars churchyard at Perth, where a slab with quaint lines and a coat of arms thereon still exists.

MYLNE (the third JOHN), succeeded his father in the office of master mason, and was master of the lodge at Scone. At the latter end of 1616 he was expressly sent for, and was engaged by the town council of Edinburgh, to complete a statue of king James I, in anticipation of that monarch's visit in the following year to his Scottish dominions: the statue had been

commenced by Benj. Lambert. He was also engaged on several works in Edinburgh, and shortly afterwards settled in Dundee. On 1st January 1623, one hundred pounds money was paid by the town council to "Johne Mylne mesone in Dundie", in part payment for the ashlar stone "worked to design and delivered from the Kingoodie quarry", for the steeple of the tolbooth at Aberdeen; (SPALDING CLUB, *Aberdeen Bugh Records*, 4to., Edinb., 1848, ii, 379): this steeple still exists. In 1630 he was engaged to make extensive additions to Drummond castle, Perthshire, portions of which remain, as well as the celebrated sun-dial in the gardens executed by him. In 1633 he with the assistance of his two sons JOHN and ALEXANDER executed the finely worked sun-dial now standing to the north of queen Mary's tower at Holyrood palace, for which he was paid the sum of £408 15s. 6d. scots. On the death of W. Wallace he was appointed 17th December 1631 principal master mason in Scotland to king Charles I, which office he resigned in 1636. From 1613 to 1651 he was engaged at Dundee on considerable works at the tolbooth and fortifications; and 1644 on the steeple of the town hall, for which last he was paid 800 marks. He died in 1637.

MYLNE (the fourth JOHN), was born 1611 at Perth. In 1636 he succeeded his father as principal master mason, and in 1637 was appointed master mason to the town of Edinburgh, receiving £100 scots per annum. He made designs for two new churches, of which the Tron church, in the Italian style, was finished in 1647. "The monastery at Glasgow, of the Dominicans, which were brought over soon after 1220, and was founded 1270, stood where is now the college church; as a fine specimen of Gothic architecture, it excited the admiration of Mr. Milne, the king's architect, who surveyed it in the year 1638; it being struck by a thunderbolt in 1668, it was rebuilt in 1699."—POPULAR ENCYCLOPEDIA, 8vo., Glasgow, 1841, iii, 454. In 1640-41 he was with the Scotch army at Newcastle. In 1642 he reported in detail upon the condition of the whole of the abbey church at Jedburgh; in 1643 was, on the death of W. Aytoun, appointed master mason to Heriot's hospital at Edinburgh, then only partly built, and continued the works to 1659. In 1646 he received the appointment from the king of captain of pioneers and principal master gunner of all Scotland. 1647 made additions to the college of Edinburgh and later; in 1648 repaired the crown of the great steeple of S. Giles' church in that city, which was thoroughly restored and decidedly altered in form by him: 1650 built the fortifications at Leith; in 1652 was elected by the crafts as one of the commissioners for the formation of a treaty of union with England, and went to London towards the end of that year, where he remained till July 1653, being paid with his brother commissioners £1 sterl. per day during the time of his stay there. "John Miln, master of wark for the mesones" was present on the 12 May 1654, when Cromwell was proclaimed Lord Protector at Perth; MAITLAND CLUB, *Chron. of Perth*, 4to., Edin., 1831, p. 43. 1656 he built the house for the professor of divinity, and six additional chambers to the college at Edinburgh; 1657 repaired the grammar school there. In Oct. 1663 he had made designs for an entire new palace at Holyrood, associating queen Mary's tower in the arrangements; a plan is in the Bodleian library at Oxford. As convener of the trades he had a seat in the town council of Edinburgh for six years ending in 1664, and on several occasions represented the metropolis in the Scotch parliament. 1666 he made designs for and commenced the building of Panmure house, Forfarshire, since much altered, but which still retains many portions, especially the handsome staircase; made a design for the existing town hall at Linlithgow; also for a new grammar school there; the drawings of all these still exist; executed parts of Leslie house for the duke of Rothes; and while there at the latter end of 1667, the town council of Perth wrote to him to ask when it would be convenient to receive a deputation to consider as to a design for building a

market cross for that city, "to be equal to none in the kingdom". He left Leslie house for Edinburgh, and after a few days' illness he died 24th December 1667, in the fifty-sixth year of his age, and was buried in Greyfriars' churchyard, Edinburgh, on the south side of the eastern entrance gate; where a handsome tomb with an inscription records he was the sixth of the family holding the office of the king's master mason, and the fourth John: it is given in MONTEITH, *Theater of Mortality*, 8vo., Edinb., 1704. He left no male issue. In 1668 the incorporation of Mary's chapel placed an inscription over the entrance door of their hall (given in LYON, *History*), in which work his portrait is engraved. A curious anecdote occurs in NICOLL, *Diary of Transactions in Scotland 1650-67*, BANNATYNE CLUB, 4to., 1836, indicating a strong party feeling, in which he speaks of Mylne as having brought the town of Edinburgh to the verge of bankruptcy, by changing the position of the pulpits several times, and dividing the "Tol-buith kirk" into two; altering the "lofts" several times; and wanting to divide the "Gray Frier kirk and the College kirk in twa kirkis".

MYLNE (ALEXANDER), brother of the last JOHN, worked as a sculptor on the public buildings in Edinburgh, and on many of his brother's buildings, besides the sundial, noticed under the date of 1633. He died February 1643, it is believed of the plague, and was buried in the site of the old choir of Holyrood abbey, where his tomb exists.

MYLNE (ROBERT), born 1633 at Edinburgh, eldest son of ALEXANDER, was apprenticed 27th December 1653, to his uncle, and succeeded him as *principal* master mason to king Charles II. He agreed 1668 to build for 4200 merks scots, the market cross at Perth, it had been removed from the High Street (it was sold 1765; *BUILDER Journal*, xxiv, 187); built the hospital at Largo, and carried on works at Thirlestane castle. In 1669 he reclaimed a considerable part of the foreshore and built a sea wall at Leith, took the area from the city on a perpetual ground rent, and on one portion erected a large stone Land of tenements, which property still remains in the family. In 1670 he was engaged on making plans for the intended rebuilding of Holyrood palace, and in the following year the drawings and designs were sent by Sir W. Bruce to Whitehall, through the duke of Lauderdale, for the approval of the king, who made considerable alterations, and directed a fresh set to be drawn. At the end of the same year, Sir W. Bruce was appointed surveyor-general of the royal buildings in Scotland, the warrant being recalled 30th May 1678. The foundation stone was laid 15th July 1671, by Mylne, whose name is cut on an angle pillar of the arcade in the quadrangle; he erected the building, which was completed 1679. At the same time he was master mason or surveyor to the city of Edinburgh; and consequent upon the new regulation that stone buildings should be erected in lieu of timber in the main streets, a vast number of new erections were commenced, in which Mylne was almost wholly engaged, and his style can be traced to this day; among other large undertakings he 1679 erected Mylne's Square and Court on his own account; and built all the city conduits after the designs of Sir W. Bruce for the water supply brought in leaden pipes from Coniston. He had also an extensive practice throughout Scotland. On 6th March 1693 he "presented a draught for finishing the steeple" of Heriot's hospital, and for the works he was to receive 3100 merks; STEVEN, *Memoir*, 8vo., Edin., 1845, p. 107. He acquired the estate at Balfarge in the county of Fife, as also a property at Inveresk, where he died 10th December 1710, aged 77 years, leaving eight sons and six daughters. An inscription to him was placed on the monument to his uncle, at Greyfriars. The appointment of *principal* master mason to the king ceased at this period for some years.

WILLIAM, mason, eldest son of Robert, was born in 1662; he settled at Leith, and died 9th March 1728, aged 66 years.

MYLNE (THOMAS) of Powderhall, near Edinburgh, mason,

eldest son of WILLIAM, was admitted apprentice in the lodge 27th Dec. 1721; master 27th Dec. 1735, and in that capacity represented it at the erection of the grand lodge of free-masons of Scotland, Nov. 30th 1736, and was grand treasurer from Nov. 1737 to Dec. 1755. He designed and built the infirmary (lately pulled down), and was engaged on various private undertakings; he became city surveyor; the style "architect" was in his later life generally adopted for that of mason as in former years. He died 5th March 1763, at Powderhall, and was buried in the tomb of his ancestors, above mentioned. His portrait by "Gul. Mosman, 1752", is in the possession of R. W. Mylne; and a copy was given by him to the grand lodge of Scotland in 1858.

MYLNE (ROBERT), F.R.S. in 1767, eldest son of THOMAS, was born 4th January 1734 at Edinburgh. After working with his father, he travelled through France to Italy, studying for five years or more at Rome, where he gained 1758 the gold and silver medals in the class of architecture at S. Luke's academy, being the first Briton to do so. He was unanimously elected a member of that academy, and also of that of Florence and of Bologna. He then visited Naples and Sicily, making careful measurements of the antiquities, and returned through Switzerland and Holland. He began to arrange his collection of drawings for publication in 1774, which his numerous professional engagements obliged him to defer.

He proved to be the successful competitor, out of sixty-nine other candidates, for a design for a bridge over the Thames at Blackfriars (GWYNN), and was appointed to build it 28th February 1760; the first pile was driven 7th June 1760, and the first stone was laid 31st October: it was opened 19th November 1769, and cost £152,810 3s. 10d., being £163 less than the original estimate. The bridge was 995 ft. long, the nine arches being 100 ft., 98 ft., 93 ft., 83 ft., and 70 ft. respectively, and 42 ft. wide: the design for the centering has been often engraved. The requirements of the present day in larger waterways, greater width for the traffic, and more moderate gradients, weighed in the consideration, and caused the removal of the bridge in 1868. It has been stated that Mylne was appointed at a salary of £300 per annum; and also that he was paid 5 per cent. for work done, 1 per cent on sales and purchases, and £100 per annum for five years' attendance at meetings, etc. (CREST, *Encycl.* 428), yet had to resort to legal proceedings before his claims were recognised, which were, however, effected in 1776 (*BUILDER Journal*, 1855, xiii, 429). The approaches to the bridge on both sides of the river were important works.

Among his other architectural works were, 1763, designs for a house for Sir Wm. Knatchbull; another for lord Gartles; 1764, stables for earl Morton; house for T. Paterson, esq., at Norwich; the assembly rooms in King Street, S. James's, called Almack's, now Willis's rooms, opened 14th February 1765, and reported at the time to have been built with hot bricks and boiling water; the great room, 100 ft. by 40 ft., was completed 1767: at Hexham, Northumberland, the bridge over the river Tyne; 1765, works at Clumber; Wormlybury for Sir Abraham Hume; large alterations at King's Weston, Hampshire, for Mr. Southwell, lord de Clifford, where it is said that on making a plan of the house he discovered a small room, which on being broken open a quantity of old family plate and deeds were found (NEALE, *Seats*, 4to., Lond., 1819, ii); the pavilion and wings at Northumberland house, Charing Cross; Blaise castle, near Bristol; repairs at Rochester cathedral; house for general Skene in Fifeshire; that for lord Frederick Campbell at Ardnacape; 1765, bridge at Welbeck for duke of Portland; 1766, house for Dr. Hunter in Lichfield Street; 1767, appointed surveyor to Canterbury cathedral; 1770, hospital at Belfast; 1772, house for Mr. Trevethick; commenced the bridge over the river Tyne at Newcastle, which was pulled down 1873 on much the same grounds as those respecting Blackfriars bridge; 1770-73, City of London

lying in hospital, City Road (MAITLAND, *London*, 4to., Lond., iii, pl. 127); 1773-79, Addington lodge, near Croydon in Surrey, for the archbishop of Canterbury (RICHARDSON, *Vit. Britt.*, fol., Lond., 1802, i, pl. 33); the embankment at the Temple gardens, etc.; 1763-65 the concert hall called S. Cecilia's hall, at Edinburgh, after the model of the opera house at Parma; Tusmore house, Oxfordshire (RICHARDSON, 1802, i, pl. 5); *cir.* 1804, Kidbrooke, near East Grinstead, Sussex, for lord Colchester (NEALE, *Seats*, 4to., 1821, iv); 1806, works at Inverary castle for the duke of Argyle (MORRIS); house for Mr. Coutts in Piccadilly; and was consulted on almost all the harbours in England. Two of Mylne's great engineering conceptions and works, were the design and carrying out of the great ship canal, 70 to 90 ft. wide, called the Gloucester and Berkeley canal; recently completed to Sharpness Point. The other, the design and obtaining an Act of Parliament for the Eau Brink Cut above Lynn, for the improvement of the Fen level drainage; it was stopped by opposition after the land had been bought, but was carried out in 1817.

He was unsuccessful in his design 1800 for new London bridge. In 1767 he was appointed joint engineer at a salary of £200, with Henry Mill (who had been with the company from about 1692, and died 26th December 1770, aged about 90 years) to the New River Company, and retired in 1800; the first stone of the new offices at Clerkenwell was laid 23th June 1770: the former one repaired and new fronted 1782: was from 1775 clerk of the works for about fifteen years, at Greenwich hospital, at about £100 per annum, with £60 for a clerk: was surveyor to the Stationers' company, for which he designed 1800 the east front of the hall on Ludgate Hill: was appointed surveyor to S. Paul's cathedral about 1761, an office he held until his death; he put up the tablet containing the well-known inscription to Sir C. Wren; designed the pulpit, carved by Henry Wyatt and a Frenchman; fitted up S. Paul's in 1789 for the visit of the houses of Parliament (a view of which is in the "Crowle collection" at the British Museum, xi, 95); and again in 1797, etc., and for the charity children of the metropolis: and was one of the original members of the Architects' Club, established October 1791. Mylne died 5th May 1811, in his 79th year, and was buried in the crypt of S. Paul's cathedral. Five out of nine children survived him. Whilst at Rome in 1757 his portrait was painted by Brompton, it was engraved 1783 at Paris by Vangeliste; a copy of it with a memoir is given in NICHOLS, *Literary Anecdotes*, 8vo., Lond., 1815, ix, 231-3. Another portrait 1795 from a miniature by M. Mylne, was engraved 1860 by H. Adlard. *BUILDER Journal*, 1864, xxii, 8. CHALMERS, *Gen. Biog. Dict.*, xxii, 549. CHAMBERS, *Biog. Dict.*, 8vo., Glasgow, 1868-70.

MYLNE (WILLIAM) second son of THOMAS, was born about 1734, became a member of the town council, and architect to the city of Edinburgh, where he practised. He continued 1763-9 the north bridge, which had been commenced 21st October 1763, at a contract price of £10,140: an abstract of the agreement, etc., is given in SCOT'S MAGAZINE, 8vo., Edin., 1769, xxi, 461, on the failure of part of the south land abutment, which was rebuilt 1772. He also designed the Jamaica Street bridge at Glasgow, 29th September, 1768-72 of seven arches, 500 ft. long and 30 ft. wide, and cost £9000: John Adam being the mason. This bridge was washed away and a new one erected 1833-35 by T. Telford. Mylne in after years settled at Dublin, where he died March 1790, aged fifty-six years, and was buried in the churchyard of S. Catherine, where a tablet was put up to his memory by his brother ROBERT, which states "he formed, enlarged, and established on a perfect system the waterworks of Dublin": WARBURTON, etc., *History of Dublin*, 4to., 1818.

MYLNE (WILLIAM CHADWELL), F.R.S., F.R.I.B.A., M.I.C.E., second son of ROBERT, was born 5th or 6th April 1781, in London. He assisted his father as engineer from an early

age: was 1804 appointed assistant-engineer to the New River Waterworks Company at a salary £150, and succeeded in 1810 to the sole conduct of the works until two years before his death, executing many important works and improvements. As surveyor to the company he laid out their property near Islington for streets and buildings, and among other buildings designed 1826-8 S. Mark's church, Myddelton Square, for 1800 persons at a cost of £16,000. Designed Gerrard's Hostel bridge, of one single iron arch, over the river Cam, Cambridge; given in HANN and HOSKING, *Bridges*, 8vo., Lond., 1843: acted for fifty years as surveyor to the Stationers' company after the death of his father: and designed alterations to and extensions of many private mansions. As a valuer he was employed by the Government in connection with the improvements in the Strand. He died 25th Dec. 1863, aged 82 years. His portrait, painted 1856 by H. W. Phillips, was engraved 1860 by H. Adlard. ROYAL SOCIETY, *Proceedings*, 8vo., Lond., 1865, xiv, p. xii. *BUILDER Journal*, 1864, xxii, 8.

Memoirs of the family prefixed to LAURIE, Hist. of Freemasonry, 8vo., Lond., 1859, p. 514: and D. M. LYON, *History of the Lodge of Edinburgh*, 4to., 1873, p. 91-5. This completes the notices of eleven generations of a family all following the same profession, which is continued by Robert W. Mylne, F.R.S., a son of the last mentioned, who is in possession of a large accumulation of professional and private papers, and original portraits, of which use has been made especially for the earlier portion of these condensed notices.

W. P.

MYLNEFIELD in Perth. The quarries on this estate are one of the most celebrated in Scotland. It supplies the DUNDEE STONE or Kingoodie stone. FORFARSHIRE STONE.

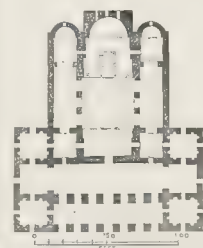
MYNAL (JEHAN), mason, *pensionnaire* of Lille, was in 1416 called to Béthune with his confrère Rachelier, mason, *pensionnaire* at the church of Théroutanne and Martin le Vinchon, master of works at the church of S. Vaast at Arras, to admit the works executed to a large tower of the fortifications of the marché aux chevaux: DE LA FONS-MÉLICOCCO, *Les artistes du Nord*, 8vo., Béthune, 1848, p. 150.

MYNCHERIE. The Saxon name for a nunnery; the nuns were called mynches. The word is still retained and applied to the ruins of such buildings in some parts of the country, as the mynchery at Littlemore near Oxford. 17.

MYNIER (JEAN), master of the works of masonry to the king at Orleans, is mentioned as having been the possessor of the ground upon which was raised in 1536 the house for François I. VERGNAUD-ROMAGNESI, *Hist. d'Orleans*.

MYNNER (LIEBHART), *baumeister*, was *werkmeister* 1395 at the cathedral at Regensburg. 69. 92. 116.

MYRA. One of the most important towns in Lycia, situated on the river Andracus, near the sea. It was a sea port (ACTS, xxvii, 5), but is now an inland town, as shown on the maps. The old konak or agha's house is a characteristic specimen of



the former mode of decorating a Turkish mansion. The ruins of the monastery of Sion with the church dedicated to S. Nicolas, which is of later date than that at Ancyra, form a group of buildings, surrounded by a large array of wooden granaries. The ruins of a theatre, 361 ft. exterior diameter, with a proscenium of 177 feet, are among the largest and best built in Asia Minor. The modillion to the Composite order is very small and within the corona, and

has a plain side and face; it has a fine frieze of half-animals issuing out of flowers; the work is Roman, but very Greek in feeling. Myra contains several other ancient public buildings; many rock-cut tombs having several chambers, with a façade of a kind of framing standing out from the rock; and the bath at the head of the river towards the Dembari-chai; copies

of some of which are in the Lycian room in the British Museum. In the vicinity is Andraki, with the remains of a large tomb or temple near it. The remains of a temple can be seen in the distance. At the entrance from the river is an extensive Roman building, known to have been a granary, from the inscription upon it. SPRATT and FORBES, *Travels in Lycia*, 8vo., Lond., 1847, i, p. 131, etc.; TEXIER, *Asie Mineure*, fol., Paris, 1839-49, iii, pl. 220-42; p. 208, 238; LEAKE, *Asia Minor*, 8vo., Lond., 1824, p. 183, 320-328; BEAUFORT, *Karamania*, 8vo., Lond., 1817; FELLOWS, *Lycia*, etc., fol., Lond., 1847, p. 196, etc. 23. 28.

MYRISTICA. A large tree called *Thounsanga*, of Tavoy, East Indies, used in boat building; and another species called *Koathoe* or *Kunneen*, is a large tree used in flooring houses. 71.

MYRTUS COMMUNIS, the common myrtle, was used by the ancients in crowning bloodless victors, and was sacred to Venus. It originally grew on the sea coast of Italy and Greece. The wood is very hard and is used for furniture, marquetry and turning. Another species, called myrtle wood, *Fagus Cunninghamii*, forms dense forests in parts which extend for many miles in Van Diemen's Land. It sometimes attains a girth of 30 or even 40 feet near the ground, and a proportionate height of from 150 to 200 ft. The wood is hard, very close-grained, and has a fresh pink or red colour. The lower part of the stem is often very beautifully veined, rendering it excellent for cabinet work; it takes a beautiful polish; *Building News Journal*, 1859, v, 669. 71.

MYSTRA, in the Morea, see MISTRA.

MYTHOLOGY. The fabulous details concerning the objects of worship, which were introduced and propagated by men who lived in the early ages of the world, and by them transmitted to succeeding generations, either by written records or by oral tradition. The subject is only introduced here for the purpose of naming a few modern publications, which may be useful to the architect and designer when requiring information or illustrations of particular deities, many of which are noticed in detail under their distinctive appellations in this work. EMERIC-DAVID, *Jupiter*, 8vo., Paris, 1833; *Vulcan*, 8vo., 1838; and *Neptune*, 8vo., 1839. DE CLARAC, *Musée de Sculpture Antique et Moderne*, edit. by Maury, 6 vols., 8vo., Paris, 1841-53; pl., 6 vols., 4to., 1826-53. CRUZZER, *Sym-*

bolik und Mythologie der alten Völker, 4 vols., 8vo., Darmst., 1836-42, and by GUIGNAUT, *Religions de l'Antiquité*, 4 vols., 8vo., Paris, 1825-51. MAURY, *Histoire des Religions de la Grèce*, 3 vols., 8vo., Paris, 1857. PRELLER, *Griechische Mythologie*, 8vo., Leip., 1854; and *Römische Mythologie*, 8vo., Berl., 1865, 2nd edit. MOOR, *The Hindu Pantheon*, 4to., Lond., 1810. SMITH, *Dict. of Greek and Roman Biography and Mythology*, 8vo., Lond., 1856. MILLIN, *Galerie Mythologique*, 8vo., Paris, 1811; and *Nouvelle Galerie Mythol.*, 8vo., Paris, 1850, by A. MAURY. MURRAY, *Manual of Mythology*, 2nd edit., 1875, founded on the works of Petiscus, Preller, and Welcker.

MYTILENE OR MITILENE. An ancient city now represented by Castro, in the island of the same name in the Grecian Archipelago, and formerly called Lesbos. The castle, which is very large, was erected in the middle ages; a curious Byzantine church is within its walls. In the court of the metropolitan church is the celebrated marble chair, with the inscription ΠΟΤΑΜΟΝΟΣ ΚΑΘΕΔΡΑ; there was a Potamon there in the time of Strabo. There is also a new mosque. A few miles to the north are the remains of a Roman aqueduct, which rivals any other similar construction; it is 500 ft. long and about 75 ft. high: *Aqueduct*, in *Detached Essay*, pl. 1, fig. 8; and pl. 2, fig. 10. DALLAWAY, *Constantinople*, 4to., Lond., 1797, p. 312. POCOCK, *Travels*.

Each country house, called *pyrgos* or tower, from the form, has a lower story for cattle and poultry; with two or three stories over, entered from external stairs, each consisting of one room, the uppermost story having generally on one or more sides the entire space filled with windows or *abatjourns* to enjoy the view; ARUNDEL, *Asia Minor*, 8vo., Lond., 1834, ii, 333. The whole island suffered very greatly by the earthquake of 7th March 1867. 28.

MYUS. An Ionian town in Caria on the southern bank of the Mæander near its mouth. A fragment found at Heracleia, which is erroneously stated to be at Myus by Chandler and Fellows, is given in SOCIETY OF DILETTANTI, *Ionian Antiquities*, fol., Lond., 1797, ii, 27, pl. 33-5. HERACLEIA. Some writers assert that Myus is now represented by Sarukomer, and is not on lake Baffi as formerly stated. 23.



DICTIONARY OF ARCHITECTURE.

NAEM

NACOLEIA. An ancient town in Phrygia Epictetus, between Dorylaeum and Cotyaeum, on the upper course of the river Thymbres. LEAKE, *Asia Minor*, p. 24, is inclined to identify the place with the modern Pismesh Kalesi, near Doganlu, but the tombs there seem to have belonged to a more important place. TExIER, *Asie Mineure*, fol., Paris, 1839-49, asserts that it is proved by coins that Nicoleia was situated on the site of the modern Sidighasi on the north-west of Doganlu: his illustrations are noticed s.v. MIDÆUM. 78.

NADALE in Marwar, the ancient fortress of Lakha of Ajmeer, the capital of a province now incorporated with Jodpoor. The temple of Mahavira, the last of the twenty-four apostles of the Jains, deserves attention; its vault is formed of horizontal projecting stones with a circular keystone, and cut to a rounded form. The most singular structure is a reservoir called *chunna ca boolee*; the excavation is immense; the descent is by a flight of grey granite steps, and the sides built up from the same materials by piling blocks upon blocks of great size without cement. TOD, *Rajasthan*, 4to., Lond., 1829, i., 696.

NADI (GASPARO) designed 1460 the palazzo Bentivoglio, destroyed by the Bolognese 3rd May 1507; also the compagna de Strazzaroli at the porta Ravegnana, built without porticoes 1496 just like it, both at Ferrara (?) MANNI, 288-9.

NADI (GIUSEPPE) of Bologna, designed 1814 the teatro Contavalli in that city, which was erected under the direction of G. B. Martinetti. He died in the same year at the age of thirty-five years. 105.

NAEMEN (Lat. NAMURCUM; Engl. and Fr. NAMUR; Ger. NAMEN). The capital of the province of the same name in Belgium, situated at the confluence of the rivers Sambre and Maas. It is the Belgian Sheffield. The walls were restored in 1817; it is a place of great strength, and has a citadel, rebuilt 1817, seated on steep rocks. There are four principal and seven minor gates, and two bridges, one of three arches, over the Sambre, cir. 1810, and another of nine arches over the Maas. A statue to Leopold I was erected Oct. 1869. Frequent sieges have deprived the town of almost all its ancient buildings. The collegiate church dedicated to S. Aubin or to S. John the Evangelist, became the cathedral in 1559; the present edifice (Roman Corinthian) was commenced 21 June 1750, and consecrated 20 September 1772; it was designed by Pizani or by Charlmagne of Dinant; and is dated 1750-67 in GOETGHEBUER, *Choix*, fol., Ghent, 1827, p. ii. The former Jesuit church of S. Loup was consecrated 1645, and made a parish church 1777. The vaulting of nave and aisles is of black stone, elaborately carved, carried by twelve red marble columns; the sanctuary paved with jasper; the walls of black stone with carved wainscot 7 ft. high; and richly carved confes-

NAGA

sionals. The old church of the Recollets, dedicated to Notre Dame, dating 1750-56, contains the tombs of counts William I and II. The churches S. Nicholas, S. Joseph, and S. Jean Baptist, deserve notice. The government house, formerly the episcopal palace, was erected 1726-7; the hôtel de ville, 1578, was rebuilt 1828 by Blanpain of Bruxelles; the episcopal palace, cir. 1810; the *beffroi* dates from the eleventh century, with additions in that of the fifteenth; the palais de justice 1464 in a part of the cloisters of S. Aubin, was enlarged 1582. The theatre 1824-25, while being rebuilt was burnt in October 1862, caused, it is supposed, by lightning.

WACTERS, *Belgique*, 8vo., Brux., 1846, p. 352; STAPPAERTS, *Belgique Mont.*, 8vo., Brux., 1840, i., 279-310; STANFIELD, *Sketches on the Moselle*; VANDER MAELEN, *Dict. Géog. de la province de Namur*, 8vo., Brux., 1832. CASTERMANS, *Parallèle*, fol., Paris, 1854, pl. 27-8, gives the plan and elevation of the château de S. Marc by A. Balat; pl. 64-5, gateway at, and elevation of, the château de Seilles; and pl. 76-8, the plans and elevation of the château de Ry, both also by him and both in the province of Namur. 14. 28. 50.

The nearly black limestone, still largely quarried in the vicinity, was used by Sir C. Wren, being imported into England about his time for paving and for steps. In S. Paul's cathedral, the black dots and paving-stones are supposed to be of Namur marble (the steps are from Anglessea, see MANX STONES; and others perhaps from Ireland).

NAGA. A village near the river Nile in Ethiopia, called Woad Naga by SMITH, and Ouâd Beyt Naga by CAILLIAUD, *Voyage à Méroé*, fol., Paris, 1823; text 8vo., 1826, iii., 124-59, who gives in pl. 9-21 plans of the ruins and of a sandstone temple 89 ft. long; and at Naga gebel ardan, also of SMITH, a site in the desert, details of four temples of late date, and a portico in the Grecian style. In pl. 22-30, he illustrates the ruins at El Mésaourat of SMITH, or El Mecaourah (also called Mecaourat), situated nine leagues distant south of Chendy, or sixteen miles west of the Astaspis: where are eight temples connected by galleries or colonnades of the era of the Ptolemies. In pl. 30 he gives three columns from the portico of the central temple, one of which, "entirely Greek", has the lowest drum ornamented with six naked figures, apparently of the same style of art; another such drum has the figures "Egyptian in style". LEWIS, *Notes on Ancient, etc., Egypt*, in *Sessional Papers*, Royal Inst. of Brit. Architects, 1875-6, p. 34, is the first to notice the resemblance of these shafts to the one lately discovered by Mr. J. T. Wood at Ephesus, perhaps of a date within thirty years of each other.

LEPSIUS, *Denkmaeler aus Ägypten*, fol., Berl., 1849-50, x., 56-71, and *Discoveries, etc.*, transl. by MACKENZIE, 8vo., Lond., 1853, p. 160-5, 233, places the column, of which he gives an

elevation, at Naga, including therein all the above districts. HOSKINS, *Ethiopia*, 4to., Lond., 1835, p. 363. HEEREN, *African Nations*, i, Meroe; COOLEY, *Ptolemy and the Nile*. The peristyle of a Greco-Roman temple is given in KUGLER, *Geschichte*, 8vo., Stutt., 1855-9, i, 74, from CAILLIAUD. 23.

NAGARA KHANA. The Indian name for a music gallery in front of almost all Jain temples. NOBUT KHANEH.

NAGA ARCHITECTURE. The Nagas (the Indian word for poisonous snakes) or snake-worshippers were too early superseded by the Buddhists to have left any important remains in India; but they appear in great strength in Cashmere and in Cambodia, where their monuments are among the most remarkable in the East. ABULFAZL, *Ayin Akbary*, translated by GLADWIN, 4to., Lond., 1777, p. 137, states that in Akbar's time (1542-56-1605) there were seven hundred places in the valley where there were carved images of snakes which the inhabitants worshipped, in addition to other places of worship. Mr. G. VIGNE published in *Travels in Cashmere*, etc., 1842, a very full account of the temples of Cashmere, and Prof. WILLIS attempted to explain their peculiarities. Baron HUGEL wrote about them, and Gen. CUNNINGHAM published in *ASIATIC SOCIETY OF BENGAL Journal*, 1848, a tolerably exhaustive memoir. The origin of the style is one of the most interesting questions, inasmuch as it can scarcely be doubted that its fluted columns, with their bases and capitals, are derived from Greek models, found probably in the neighbouring Greek kingdom of Bactria. CUNNINGHAM was the first to point out their most striking peculiarity, which is that all the temples stand now in the water, or in courtyards, which were capable of being filled with water. The mission which the Aryans set themselves to fulfil seems to have been specially the destruction of the snake-worshippers; the Buddhists converted them cir. B.C. 250; the Naga worship was resumed A.D. 53, the Naga dynasty 615, enclosure at MARTUND built 752, temple at Avantipore built 890, temple at PANDRETHAN, built about 1000, and the Moslem conquest of Cashmere 1300.

No temple of the Vishna or Jaina religion is without its complement of seven-headed snakes, and in no part of the country, except in Cashmere, are temples found dedicated exclusively to this worship. The woodcut given *s.v.* MARTUND explains the peculiarities of the style; the pillars are almost identical with those of the Grecian Doric, and wholly unlike anything found in any other part of India; a pillar found at Serinagar is a far more ornamented example. A trefoiled arch is also everywhere prevalent. The temple at Martund dates about 600 to 750; the court is 220 ft. by 142 ft. inside, and having eighty-four pillars—a sacred number with the Hindoos, and between each pair was a cell. In the centre is the temple, placed on a plain basement, marking the height to which the water could rise. Another temple at Bhaniyur, near Noushera, is 120 ft. by 145 ft., with a temple 26 ft. square. Others at Pandrethan; and at Payech, quite complete. At Avantipore, one of great beauty, the ornament of the columns resembling work at Mycenæ. In Cambodia, are the extraordinary temples of the ruined cities of Nakhon Wat, Ongcor Thom, Paten ta Phroh, etc., excavated 1858-61 and described by MOUHOT, *Travels in Indo-China, Cambodia, and Laos*, 8vo., London, 1864; later by A. BASTIAN, an account by whom is given in the *Journal of the ROYAL GEOGRAPHICAL SOCIETY*, XXXV; also the photographs by J. THOMSON, who read a paper on this subject before the BRITISH ASSOCIATION at Nottingham.

The architectural history is confined to the four centuries between 951 and 1357, when the country was conquered by the Siamese, the old capital deserted, and no more temples built. For the first three centuries Nakhon Thom (the Indian *Nagara* or *Nugger*, and *thom*, or the great city) was the capital. About the middle of the thirteenth century it was transferred to (1250-1350) a site some fifteen miles further east, and called Paten ta Phroh, or city of Brahma. The last, Nakhon Wat, was the greatest and best, the city of Ongcor, or Ongou,

as it is popularly named. Besides these, MOUHOT and BASTIAN describe ten or twelve other temples, some of considerable extent. That of Prasat Keo is older than the above three; the temple on Mount Bakeng is still older. On the same hill is another of considerably later date; it is a seven-storied pyramid, the lowest terrace measuring 225 ft. square, and is above 50 ft. in height. On three of its terraces stand seventy-two small temples; on the upper platform is a small dagoba reached by flights of steps on the centre of each face.

The palaces and public buildings of Ongcor seem to be quite worthy of its temples, and are in a more ruinous state. The walls of the cities are of great extent, constructed of large blocks of stone. Their roads were of great perfection; one great trunk road seems to have stretched for three hundred miles; it was a raised causeway paved like a Roman road, with a bridge over each stream; one, 400 ft. long and 50 ft. wide, is described by Dr. BASTIAN as richly ornamented by balustrades and cornices and representations of snakes and the snake-king, and is constructed by a system of bracketing or horizontal arches, without cement. The sculptures of Nakhon Wat represent chariots with wheels from 3 to 5 ft. high with sixteen spokes, which must all have been of metal, and this before the thirteenth century; and their architects were the only ones who had sufficient mechanical skill to construct their roofs wholly of hewn stone, and who could dovetail and join them so beautifully that they remain watertight and perfect after five centuries of neglect in a tropical climate. The artistic merit which pervades every part of their designs is alone more than sufficient to recommend their study to the architect. This account has been condensed from FERGUSSON, *History of Arch.*, 8vo., Lond., 1867, ii, 703-32, which is largely illustrated by woodcuts of these interesting remains.

At Nayativoe or Haartem, an island at the north-west extremity of Ceylon, is a small Hindoo temple sacred to Naga Tambiram or the god of serpents, in which are a number of cobras de capello, that are daily fed by the Pandarams. 50.

NAGA. A name given to jars with a figure of a dragon traced upon them by the Djaks. MARRYATT, *Pottery*.

NAGASAKI, situated on a fine bay, is one of the five imperial cities of Japan. It covers a plain at the end of the harbour, which is about 4 miles long and 1 mile wide, and consists of between eighty and ninety streets formed at right angles to each other, broad enough for wheeled vehicles, and kept very clean; the houses are of clay and straw, surrounded by a verandah, and each stands in a garden, curiously laid out. The Dutch factory of Decima is situated on an island about 200 yards in length. There are two government palaces; and about seventy temples, called *yasiro*, within a short distance, built like the houses; and smaller ones called *miyas*: many have large rooms, which, not being devoted to worship, are let out to travellers and others. A view of the harbour, etc., is given in the *ILLUSTRATED TIMES*, 1863, iii, 339-40. OLIPHANT, at British Association 1859; MACFARLANE, *Japan*, 8vo., New York, 1852, p. 125.

NAGY SZELEN, in Transylvania, see IERMANNSTADT.

NAIL (It. *chiodo*; Span. *clavo*; Fr. *clou* (also *broche* and *broquette* for special nails); Ger. *nagel*). A pin of metal, more or less large, of various sizes, and having heads varying for the several purposes for which the nail is required. It is used for joining or securing two materials together, chiefly wood, and is inserted so as to enter both pieces, and to bind them together with a force equal to that required for their extraction.

The principal nails now in use, whether used in building or for other purposes, are here enumerated. *Back, bothom, or bottom nails*, whose shanks are flat so as to hold fast but not open the wood. *Bullein nails* have round heads and short shanks, tinned and lacquered, for hangings, covering of stools, etc. *Clamp nails* are for fastening clamps. *Clasp nails, or brads*, are those with flatted heads, so that they may clasp the wood, and thus allow of being sunk in the wood to admit of the

plane going over it. The sorts in most common use in building are known by the names of *tenpenny*, *twenty-penny*, and *two-shilling nails*. *Clench* or *boat nails* are such as are used by boat and barge builders, sometimes with boves or nuts, but often without. They are made with clasp heads for fine work, or with the head beat flat on two sides. *Clout nails*, used for nailing clouts on axle-trees, are flat-headed, and iron-work is usually nailed on with them. *Deck nails*, for fastening decks in ships, and floors nailed with planks. *Dog* or *jobent nails*, for fastening the hinges of doors, etc. *Flat point nails* are of two sorts, *long* and *short*; the former much used in shipping, and useful where it is necessary to hold fast and draw without requiring to be clenched; the latter are furnished with points to drive into hard wood. *Lead nails*, used for nailing lead, leather, and canvas to hard wood, are the same as clout nails dipped in lead or solder. *Port nails*, for nailing hinges to the ports of ships. *Ribbing nails*, used for fastening the ribbing to keep the ribs of ships in their place while the ship is building. *Rose nails* are drawn square in the shank. *Rother nails*, chiefly used for fastening rother irons to ships. *Round head nails*, for hinges or other use where a neat appearance is required. *Scupper nails*, much in use for fastening leather and canvas to wood. *Sharp nails*, much used in all countries, especially in the West Indies, and made with sharp points and flat shanks, for ordinary uses where soft wood is employed. *Sheathing nails*, for fastening sheathing-boards to ships; their length is usually three times the thickness of the board. *Square nails* are of the same shape as sharp nails, chiefly used for hard wood. *Brads* are long and slender nails without heads, used for thin deal work to avoid splitting. *Tacks*, the smallest sort, which serve to fasten paper to wood; the *middling* for medium work; and the *larger size*, which are much used by upholsterers: they are known by the name of *white tacks*, *two-penny*, *three-penny*, and *four-penny tacks*. They are usually sold six score to the hundred. All these names being inserted in this dictionary, reference should be made to them; also to *BOAT*; *BOSS*; *DOUBLE GARRON*; *HOLDFAST*; *LATTBRODS*; *LATH* or *reparation*; *PIN*; *PEG*; *RIVET*; *SPIKE*; *TENTERBOOK*; *WALL-HOOK*; etc.

1. 4. 5. 13. 41.

In the subsidy of 1660, 12th Charles II, c. 4, the nails mentioned are called chair, copper, rose, saddlers', head, harness, small, and spring, with tenter hooks. *LANGLEY, Bricklayers' Work*, 8vo, Lond., 1747-50, p. 53-65, notices that the prices of nails had fallen before his time, but still kept their names; which, with their lengths and weights, are described by him. But *SALMON, London Builder's Vade Mecum*, 8vo., Lond., 1745, p. 54-6, enumerates the various sorts, and gives their weights and prices.

The *ADHESION* (see also *MANGIFERA Indica*) of nails were experimented upon by Mr. Bevan (the details are given in the *PHILOSOPHICAL MAGAZINE*, 1824, lxiii, p. 168; abstracted in *GILL, Technical Repository*, 8vo., Lond., 1826, v, 248; in *GWILT, Encycl.*, edit, 1876; and in *PENNY CYCLOPEDIA*, Supp., i, 121). They appear to have been made with *wrought nails*, which for the ordinary purposes of the carpenter and joiner, have been in a great measure superseded of late years by nails cut cold by pressure from thin sheet metal, and subsequently headed by a separate machine. Such nails are cheaper than wrought nails, and owing to their greater accuracy of form, their sectional form being a perfect rectangle with sharp defined angles, they have a firmer hold in the wood; but no record of experiments proving this have come under notice. They are tougher than wrought nails; but being softer and more easily bent, they are not adapted for using with hard woods.

Common *cast nails* are clumsy and brittle, and only used for a few rough purposes, as in lathing, and nailing up fruit trees; the strength of these last is reported upon in *MECHANICS' MAGAZINE*, 28th April 1871. A useful kind of *cast nail* for soft woods, is made of malleable cast iron. They are neat

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and regular, and being annealed, the metal will bear far more bending than ordinary wrought iron, without injury; but this tenacity is obtained at the loss of rigidity, such nails being often nearly as soft as copper.

The making of *wrought nails* is effected by a workman called a *nailor* from narrow square rods of iron of various sizes; one being heated, he forges its end upon an anvil to a tapering point; this is then cut off to a length adjusted by a gauge by laying it across a fixed chisel called a *hack-iron*, which in some cases completes the nail. In others, the red-hot spike just cut off is taken up and dropped, point downwards, into one of the holes of an instrument called a *bore* (*NAYLTOYL*), which is a piece of iron about twelve inches long, with a perforated knob of steel at each end. The holes of this instrument are made to fit the upper or thicker part of the nail, and so countersunk at their upper ends as to form a kind of mould for the head of the nail. A few well directed strokes of the hammer upon the thick projecting end of the spike converts it into a head of any required shape. *HOLLAND, Manufactures in Metal*, in *LARDNER, Cabinet Cyclopædia*, i, 192-218, gives much curious information on nail manufacture; a circular forge, and a recital of a nailor's dexterities, taken from the *MECHANICS' MAGAZINE* for 1828.

14.

The high price of *wrought nails* and the inefficiency of *cast nails*, has led to the introduction of *machines* for forming nails by cutting, stamping, or compression, out of plates or rods of rolled iron. For ordinary purposes *cut nails* from the smallest brad up to spikes six inches or more in length have almost superseded those wrought by hand. Descriptions of these machines will be found in *BARLOW, Treatise on Machinery*, etc., in the *ENCYCLOPEDIA METROPOLITANA*; *URE, Dict. of Arts*, etc.; and *HEBERT, Engineers' etc. Encyc.* The machine-made nails of the United States were of great importance in 1851. In 1852 patent wrought nails were submitted by the agents in London, Higgs and George, to the notice of builders, contractors, and ship-builders, as being superior to any others, and cheaper. They have the toughness of the best handmade nails, with far greater uniformity of make. The flat-pointed rose nails are particularly recommended wherever oak or other hard wood is used: being perfectly chisel-pointed, they require no boring, and will drive into the hardest wood without splitting it, and their heads, being very strong, do not fly off. In 1860 it was stated that Messrs. Ewbank were the first to furnish machine-made nails capable of competing with those forged by hand: these were continued by Cordes and Co., and manufactured out of scrap and the best kinds of pig iron; they are all uniform in make and quality and each one perfect, and count full 1000 to the M. Another process for the accomplishment of the same object is now in the hands of Messrs. Halkett and Bates of Manchester; their patent wrought nails claimed to be superior to those made by hand, as the head being made at the same stroke with the remainder of the nail, is not liable to break off when hammered even into the hardest wood. The full count also go to the same weight of nails; *BUILDER Journal*, 1860, xviii, 156; which 1862, xx, 774, describes a Swedish machine worked in the Great Exhibition of that year, as far exceeding others.

In 1861 a company was formed for bringing into practical use the *spiral fluted nails*, an invention of W. Wiggzell of Exeter; however large the nail, or however hard the wood, they require no holes to be made before driving, as the spiral point causes the nail to revolve as it advances; where it is probable the nail may have to be extracted, another is made with a head having a slot or screw by which it can be turned even more readily than a screw, whilst it could be driven into a floor with less than a quarter of the labour caused by the use of screws. Experiments on the adhesion of such nails are given in *BUILDER Journal*, 1861, xix, 604, from the *Devonport Independent* newspaper.

The nails of Venice enjoy a very great reputation, and meet

with a considerable sale in different countries, especially in the Levant. Three barrels of them, with a full detail of the manner of making them, were imported into Belgium in 1846, for the purpose of promoting the manufacture of them. In 1851 the Belgian nails, principally of the small sizes called "Flemish tacks", were very remarkable; the sorted samples of handmade nails by the Société Anonyme de Couillet were considered deserving of the highest mark of commendation by the jury of the Exhibition 1851. The handmade nails of Austria also were of excellent quality, and remarkable for a peculiar twist given to the shank of the nail, which is said greatly to increase its tenacity. For railway spikes this twist had been in use, though not generally, in the United Kingdom; but its application to small sizes was shown only in the Austrian examples. In France, nails of a round form are generally used: they are cylinders sharply pointed, require no bradawl to make a hole; and are perhaps more easily driven into the hard woods generally used in that country, and when in, it is stated they hold much more firmly and never start.

In some operations the nail is secured by *clenching*, or bending down its point after it has been driven through the material. HEBERT notices a better plan, of putting over the point a little perforated piece of iron plate called a *rove*, and then clenching or riveting the end upon it. This mode of fastening appears to be almost entirely confined to boat building.

Nails of iron with ornamental brass heads are used where the common ones would be unsightly, or are required for ornament. Heads of nails are frequently made ornamental to the work itself to which they are applied, by running the nail through a pattern cut out of wood, zinc, or brass, in the form of a quatrefoil or other shape. The heads of nails in early mediæval work had considerable projection. Others wholly formed of brass, copper, or metallic alloys are used in ship building and for a few other purposes. M. Kuhlman asserts that the use of iron nails in building wooden ships, is one of the chief causes of their decay, from a process of slow combustion or oxidation, the iron acting as carriers for oxygen, introducing it into the substance of the timber, as related in *BUILDER Journal*, 1860, xviii, 47. In the upper deck of the Driver steamer, Mr. Blake in 1841 saved the expense of copper or composition nails, by punching the nails down one inch and filling the hole with a circular plug dipped in white lead. Copper and zinc nails are used in fixing on slates. Iron nails are tinned, where rusting would be injurious: this was done by the mediæval builders.

VANE, *British Nail Trade*, in which the transactions of the workmen and masters as amongst themselves, with regard to length of nails, allowance in sale, waste of iron, as well as the reckoning, settling, and ledgering their accounts, etc., are thoroughly considered; oblong 4to., 1841. 1. 13. 14. 17.

Round-headed bronze nails found in the so-called treasury of Atreus, at Mycenæ, are figured by Sir W. GELL; they were made of an alloy of 88 copper to 12 tin. Bronze nails were used in the doors at Herculaneum, according to WINCKELMANN; who mentions a bronze nail with a fly sculptured in relief. The heads of those in the doors of the Pantheon are 5 in. in diam. The head of a bronze nail in the Roman college has nearly the figure of a parasol, or mushroom; and the length of the square tail is engraved with many characters. Iron nails with flat heads have been found in British barrows, from half-an-inch to five inches long; HOARE, *Ancient Wiltshire*.

In 1279 at Rockingham Castle: lathe nayle at 8½d. per 1000; bord nayle at 1s. 6d. per 100; 'magnis spiking' 2½d. per 100; 'wyt nayle', perhaps wrought nail, at 6d. per 100; 'clut' or clout nail for fastenings and bars, at 1d. per 100; Roll, 9th Edward I, in *ARCHÆOLOGICAL JOURNAL*, 1845, i, 371. 1365-6; the accounts for S. Stephen's chapel, Westminster: nails with tinned heads for the new doors, cost 10d. per 100; same for the windows, 8d.; 'spykyngs' for the scaffolds and other works,

8d. per 100, and 5s. 6d. per 1000; 'dornails' at 4d. per 100; black window nails 2s. 6d. per 1000; shingle nails for the roof of the great hall, cost 19s. 4d.; 'selyng' nails 2s. 1d. per 1000, and small ones 2d.; 'rove' nails for lathing 1s. 4d. per 1000; 'tyrauns' and 'traun' for the same, 1s. and 11d.; springs for same, 10d.; BRAYLEY and BRITTON, *Palace of Westminster*, 8vo., London, 1836, p. 191. Broddes, or slate pins of wood or bone; stanbroddes (stone broddes); strabroddes (straw-broddes); chingil nails or tingil nails; gullet nails; lat or lath nails; lead nails also called kyrkeduale; sharplings; single and double spikings; and scotsem nails; brags are not mentioned; SURTEES SOCIETY, *Fabric Rolls of York Minster* (1360-1639), 8vo., Durham, 1859, p. 348. 1531, at Hampton Court palace: double tenpenny nails 'inglys', at 11s.: single tenpenny nails 5s. 8d.; sixpenny nails 3s. 6d.; fivepenny nails 2s. 10d.; fourpenny nails 2s. 4d.; and wrought nails 10d.; all at per 1000: the third and first were used in the largest quantities, and were obtained of Raynalde Warde of Budley; FELIX SUMMERLY, *Handbook*; *BUILDER Journal*, 1857, xv, 592.

NAIL. A measure equal to 2½ in. in length, used in England, chiefly in cloth measure; four nails making a quarter of a yard.

NAIL-HEAD MOLDING (Fr. *diamant*). An ornament common in Norman architecture, and is so called from being formed by a series of projections resembling the heads of nails or of angular or square knobs. DIAMOND and FACET. 1. 19.

NAILSWORTH STONE. A cream-coloured stone from the lower or great oolite, obtained from near Stroud in Gloucestershire, used chiefly for pitching, paving, etc. the weight varying from 130 to 118 lbs. per cubic foot. The quarries at this place yield some of the largest blocks obtained in the country.

NAILTOIL, see NAVITOL.

NAISH (THOMAS), clerk of the works to the fabric of Salisbury cathedral, in 1691 made a report on that edifice, with an estimate of the charge of bringing it into good repair, which is given and commented upon by T. H. WYATT, *Chapter House, etc.*, in a paper read at Royal Inst. of British Archts., April 1843, and printed in *CIVIL ENGINEER, etc. Journal*, 1843, vi, 161.

NAKED FLOOR. The assemblage of timbers in a building, used for supporting the flooring boards and ceiling of a room; there are three sorts, SINGLE FLOORING, DOUBLE FLOORING, and DOUBLE FRAMED FLOORING. All publications on Carpentry illustrate their formation.

NAKED OF A WALL. That general face of a wall whence projections take their rise.

NAKHON THOM, and NAKHON WAT or ONGCOR, in Cambodia; see NAGA ARCHITECTURE; and FERGUSSON, *History of Arch.*, 8vo., Lond., 1867, ii, 703-32.

NAKOLAKEVI, the ancient ARCHÆOPOLIS or Aea, in Colchis, now Mingrelia. The capital of the kingdom of the Lazic, which sustained in 551 a memorable siege by the Persians, as described by PROCOPIUS, B. G., iv, 13. There exist the ruins of the palace and the ancient church, which was restored by Justinian (527-65); a view of the church is given in pl. 9, ser. 2, of DUBOIS DE MONTPEREUX, *Caucasus, etc.*, fol., Paris, 1839-43; and text, 8vo., ii, 106; iii, 52.

NAKSH I ROUSTAM, see MOURGAUB. It is called Naxi Rustan, in CORNEILLE LE BRUN, *Voyage*, fol., Amst., 1718, p. 281, who notices the tombs.

NAMATIUS, bishop of Clermont, towards the end of the fifth century raised a church in the town, which rivalled in grandeur and in magnificence that of S. Perpétua at Tours. It was in the form of a cross, with an apsidal end and transepts. It was 150 ft. French long, 60 ft. wide, and 50 ft. high to the vaulting; in it were 42 windows, 70 columns, and 8 doors. The divisions of the nave were ornamented with many sorts of marble adapted together. It was entirely rebuilt in the

tenth century; GRÉGOIRE DE TOURS, b. 2, cap. xiv; b. 10, cap. xxxi. The wife of Namatius built outside Clermont a basilica dedicated to S. Stephen, and wishing to have paintings in it, she read from a book of history, and told the painters what subjects they were to represent; *ibid*, b. 2, cap. xvii. RAMÉE, *Hist. de l'Arch.*, 8vo., Paris, 1843, ii, 114.

NAMUR, in Belgium, see NAEMEN.

NANCY, sometimes written NANCY. Formerly the capital of the duchy of Lorraine, now of the department of the Meurthe, is situated on the river of that name. It is divided into the old and new towns; the former having the Gothic castle and many buildings of antiquity in narrow and winding streets. The new part is regularly laid out, and the houses generally are of good design. The porte Stanislas, a triumphal arch, dates 1762; the porte de la Craffe 1836, restored 1861; and the porte royale 1751; there is also the porte S. Georges. The cours d'Orléans is a well planted promenade. The *place royale* is the finest of the squares; one side is formed by the *hôtel de ville*, one of the handsomest in France, containing a gallery of pictures; two other sides are occupied by the office of the prefect; the custom house; the theatre 1705 or 1771, by F. Galli Bibiena, given in DUMONT, *Salles*, fol., Paris, 1774; and some private houses. In front of the town hall is a triumphal arch in honour of king Louis XV, erected by C. Mique, for king Stanislas.

There is also a statue to Dombasle; one to General Drouot 1853 by David of Angers; an equestrian statue to duke René II; one erected 1831 to Stanislas I. Leczinsky, king of Poland and duke of Lorraine (1704-18, 1733-66), who settling hereat bestowed on the town many of its finest embellishments, designed and carried out by E. HERÉ DE CORNXY, which are noticed under his name in this work. He also employed V. Louis. The *hôtel de Craon*, afterwards the palace of Stanislas, by G. de Boffrand, is now the government house, and is connected with the palais de justice by a circular colonnade. The ducal palace, commenced 1502, has a *portail* of Flamboyant Gothic of the sixteenth century, a noble specimen of civic architecture; it is engraved in DU SOMMERARD.

The cathedral, dedicated to the Virgin Mary, completed 1742, has a double or triple row of Corinthian columns for a portal, flanked by two square towers. The church of S. Epvre, the parish church of the dukes, erected 1451, but rebuilt 1872. The church of the Cordeliers, 1484, contains the tombs of several dukes of Lorraine and others; the chapel adjoining the choir built 1608 is in the form of an octagonal mausoleum, which was restored 1822-5; it contains seven tombs in marble of the dukes. The church of the filles Ste. Marie, was by J. D. Antoine, *cir.* 1780. A new Gothic church 1874, near the porte S. Nicholas. The little church of Notre Dame de Bon Secours, outside the town, has the monuments of Stanislas and his wife, died 1747; it was erected by him 1738 to replace one built by René II. There is also a new church of S. Leon; and an ancient tower belonging to the chapel de la commanderie de S. Jean.

The exchange; the university, in which is the public library founded 1751, and consisting of upwards of 40,000 volumes, and many MSS.; the royal college; *la primatiale* by F. de S. Urbain; the salle de comédie 1750 by Montluisant, who restored the *hôtel de l'intendant*, and erected the stabling; the museum; several hospitals; a large covered market; and the barracks of S. Catherine 1764, one of the largest buildings of the sort in France, comprise the other important edifices.

GRILLE DE BEAZELIN, *Archæologie, Arrondissements*, etc., 38 pl., fol. POULET ET ROUX, *Recueil d'Edifices en France*, fol., 1840-41; pl. 46, a *portail*. LAMOUR, *Recueil des Ouvrages en Serrurerie*, etc., fol., Nancy, n.d. (1767). GRAND EURY AND LALLEMENT, *Eglise S. Epvre*, 1856. 14. 28. 50. 96.

About a mile from Nancy, the château called the palais de la Malgrange, is one of the best designs of G. de Boffrand; it was destroyed before 1788; it is published by MOREY, 8vo., Nancy,

1865. The abbey church of S. Leopold was designed by L. Durand de S. Mihiel. The porte des Iles on the road to Metz was by Melin and R. Mique.

NANDEBUAY. The native name of a wonderfully hard and enduring wood of Buenos Ayres.

NANKIN or NANKING (officially Kiangning-foo). The capital of the province of Kiangsoo, and formerly the capital of China under the Ming dynasty, until the government was transferred about the end of the thirteenth century to Peking. It is situated near the river Yang-tse-kiang. The old walls may be traced for about 35 miles, but the place is now reduced to about 18 miles, the walls being in some places as much as 40 feet in height. Some of the gates are still magnificent, three on the east side are approached by causeways of stone over the marsh land, on a great part of which the city is built. The four principal streets are of moderate breadth; the houses are mean and of only one story. The portion occupied by the Mantchoos is separated by a wall from the Chinese town. A Mahomedan mosque with a lofty minaret was erected during the Tâng dynasty; also a Buddhist establishment founded A.D. 622. All the ancient palaces and temples have disappeared, having been destroyed 1645 by the Tatars in their first invasion, the only remarkable remains being some sepulchral statues near the walls. It is now the residence of the governors-general of three provinces. There are a large number of manufactories for fine satin and crape, the cotton cloth called nankeen, paper and ink, and flowers of pith paper.

The most remarkable structure is Paou-gün-sze or the porcelain tower, pagoda, or more properly *taa*, called the Recommending Favour Monastery, or temple of Gratitude, erected 1412-31 to an empress of the Ming dynasty, and pre-eminent above all other similar buildings in China for its completeness and elegance; it is said to have cost 400,000 taels (or 2,458,484 taels, GUTZLAFF). It is of an octagonal form, 200 ft., 208 ft., 261 ft. (236 ft. FEROUSSON, fig. 87, to the top of the iron spire) high, each side of the base being 40 ft.; there are nine stories, all equally high except the ground floor, which is the highest, each with its cornice and gallery covered with a roof of green tiles with a bell at each corner, there are 144 bells in all: on the top is a pinnacle in the shape of a pineapple, surmounted by a golden ball: the top story is reached by a spiral staircase of one hundred and ninety steps; there are some apartments richly gilt. The brick walls are coated with porcelain, as well as the upper and underside of the roofs, producing a brilliancy of effect lost in all engravings of it. The LITERARY GAZETTE of 1853, p. 1245, records the destruction of this tower by the Chinese insurgents; but the BUILDER JOURNAL, xv, 168, states it was destroyed in November 1856, quoting the *China Herald*.

GUTZLAFF, *China Opened*, 12mo., Lond., 1838, i, 76. DU HALDE, *History of China*, fol., Lond., 1738. ELLIS, *Journal of the late Embassy*; CALLERY AND YVAN, *Insurrection*, 8vo., Lond., 1853, p. 220. DAVIS, *The Chinese*, 12mo., Lond., 1836; 1844-45, ii, 96. ILLUSTRATED LONDON NEWS, 1842, i, 421; ii, 20, 183. 14. 50. 72. 96.

NANKIN GRANITE of the Vosges mountains in France, is a kind of NANKIN MARBLE with small lenticular grains; see GRANITE, p. 78.

NANKIN or Chinese MARBLE, see CHINESE ARCHITECTURE, *Detached Essay*.

NAN-MO. A timber tree of China, which supplies a very long straight trunk, with wood similar to that of cedar, although the two trees differ widely in their leaves. It is used in temples, palaces, and houses of state, on account of its straightness and durability. It was an article of impeachment against the minister of Kien-joong that he had presumed to use this wood in the construction of his private palace. It serves for pillars, windows, gates, and beams, being employed in the exterior as well as the interior of buildings, as it is not affected by the action and variations of the atmosphere, or by insects;

the natives indeed imagine it will never decay. DE PAU says it furnishes sticks from 12 ft. to 13 ft. high of useful wood; CHAMBERS limits it to a smaller size. DAVIS, *Description of the Empire of China*.

1. NANNI (GIOVANNI DE'), called il Ricamatore, and better known as Giovanni da Udine, see RICAMATORE (G.).

NANNI DI BACCIO BIGIO, see BIGIO (NANNI LIPPI).

NANNI DI BARTOLO, called also Rosso, see BARTOLO.

NANTES (the Latin *Condivicium*; Nannetum or Nannetes). The capital of the department of Loire Inférieure, in France, situated on the river Loire, where with the river Erdre it forms a number of islands, two of which are among the best quarters of the town, the communication being kept up by many bridges of more or less importance; one of them which was existing about the middle of the seventeenth century was formed of stone piers with a timber platform, and on the piers were shops, as shown in VIOLET LE DUC, *Dict.*, s.v. Pont, p. 247. The building docks of S. Nazaire are of great extent. The castle, formerly the residence of the dukes of Brittany, is an enormous mass of irregular buildings of the 14th and 16th centuries, flanked with round towers, built of slate and granite; the ramparts have been nearly all removed: the castle of Bouffay has a lofty polygonal tower, now used as a prison. There are about twenty squares; the quay (on which runs the railway) extends nearly two miles; the street *La Poissonnerie* is a remarkable relic of olden time, the upper stories of the houses projecting so as nearly to meet across the street: the old town on the west of the cathedral was entirely pulled down between 1865 and 1870, and the ground laid out anew. The new town was commenced 1784 by Mons. Graslin, whose name was given to the *place* of the theatre; the houses are built of white stone from Saumur, and are well designed. Many of the numerous villas in the vicinity are in the English style. The town ranks as one of the finest in France. The departmental column is 70 ft. high; and in the *place* Louis XVI is a column surmounted by a statue of that king; in the *cours* are the statues of the duchess Anne, and the constables Duguesclin, Clisson, and de Richemont. W. FOWLER published a *tesselated floor* of a bath found at Nantes.

Nantes is the seat of a bishopric dating back by some to the third century. The cathedral is dedicated to S. Pierre; the apse is partly earlier than the tenth century, the choir (plain Romanesque) is of the two following centuries, and was enclosed with new walls preparatory to rebuilding at the end of the fifteenth century. The nave 120 ft. high to the roof, is of the style *ogivale tertiaire*; its lofty and richly sculptured portal was commenced 1434, but proceeding slowly the three doorways were not completed 1481; the upper part was left unfinished; the two towers, not much higher than the roof, were added to in the Renaissance style. The north transept and choir were restored from 1850, by Scheult (DALY, *Revue générale*, viii, 284, 340, notices some irregularities). The tomb of John IV of Bretagne is of alabaster, erected 1408 by three masons of London; RYMER, *Fœdera*, viii, 510; FORSYTH, *Antiq. Portfolio*, i, 78: therein is also the splendid Renaissance monument to the last duke and his wife, executed by Michel Colomb, the predecessor of J. Goujon. The church of S. Nicolas (Gothic) built 1843-55 by J. B. A. Lassus, at a cost of £100,000: that of S. Clement is another modern Gothic structure.

The hôtel de ville; the palais de justice finished 1852; the hôtel de la préfecture, formerly the chambre des comptes (Ionic); the episcopal palace; the exchange, commenced 1792, suspended but completed 1812 by M. Crucy, has a peristyle of ten Ionic pillars having a statue over each; the salle de spectacle 1786 by M. Crucy and G. J. Henri, was rebuilt 1810 after a fire. The other public buildings are the museum of natural history; a good gallery of pictures; the old mint now occupied by the courts of justice; the *hôtel des monnaies*

1825 by — Gengembre, at a cost of 130,000 fr., it is the first special one of the century; GOURLIER, etc., *Choix d'édifices*, fol., Paris, 1837, i, pl. 203-4; the hôtel dieu or general infirmary, and le sanitat; the hospice des enfants trouvés, cir. 1786, by G. J. Henri; the abattoir 1824-30 by — Malary, carried out by Démolon (*Detached Essays*, Abattoir, p. 3-4); the Salorges, now used as a dépôt for general merchandise; and the corn market, a modern and large building having above it the public library of 48,000 volumes.

BENOIT, *Nantes et la Loire inférieure*, fol., Nantes, 1850. MACÉ DE VAUDORE, *Dict. Hist. Geog. etc., de N.*, 4to., N., 1836. GURPIN, *Hist. de N.*, 4to., N., 1839. TOUCHARD-LAFOSSE, *La Loire*. RITCHIE, *Wanderings by the Loire*, 8vo., Lond., 1853, p. 174. POTEL, *La Bretagne et ses Monuments*, 50 views, fol., N., 1844. NODIER ET TAYLOR, *Bretagne*, fol., Paris, 1845-6, i, p. 42, gives many plates illustrating the castle with the house and chapel of the dukes, the well, tomb of Francis II, door of the cathedral, beffroi, hôtel of S. Aignan, the collége, the court, staircase, and chimney of the Palette or bishops' old residence, the château de Chateaubriand, the chamber of Fr. de Foix, the château d'Ancenis, and the tour d'Oudon; while in ii, p. 323, a sculpture of a figure in a large chair, serving also for a bookcase (late Gothic). They also illustrate works at Clisson, Bourg de Batz, Guérande, etc.

14. 28. 50. 96.

NANTES (ANDREA DE), seems to have been a foreigner, and brother of JUAN de Nantes, hereafter mentioned. He lived in great credit at Madrid towards the end of the 16th century. He made a design for the principal cloister of the convent of Felipe el Real, the cost of which was to be 20,000 ducats, with 100 ducats "gratification", which he presented to the chapter in 1600. This design was approved, but not put into execution, as the prior, Fr. Felipe Henriquez, having communicated it to Francisco de Mora, the latter made so many corrections and improvements, making a present of them to the fraternity, that it was considered most advantageous to adopt them, which was done accordingly.

66.

NANTES (JUAN DE) ó DE ENANTES, was called in with other *maestros* in the year 1588, by Juan de Ribero Rada to examine the designs of Rodrigo Gil, for the cathedral at Salamanca, and appears to have offered, in common with his colleagues, some of his own for the same edifice, but whether they were in the Italian or the German-Gothic styles, both of which types are mentioned, there is nothing to show. They were, however, not adopted, as those of Juan di Ribero Rada were preferred. Nantes superintended the carrying out 1600-9 the last-named architect's design for the large church of the Benedictine monastery of S. Cloyo or S. Claudio at Leon, which if completed would have been one of the grandest in Spain; the works were stopped in 1609. Nantes made partial designs for this church, and of the 26,000 ducats which it cost, he received 17,000. He designed and superintended about 1600 the principal cloister of the convent of San Felipe Real at Madrid. Mention is likewise made of him as connected with Alberto de la Madre de Dios, a barefooted Carmelite, in conjunction with whom he offered in 1613 to the Consejo de las Ordenes a design for continuing the colegio del Rey at Salamanca, which R. Gil de Hontañon had commenced in 1566, and remained unfinished in his time.

66.

NANTES, error for XAINCTES, see ISEMERT.

NAOLOGY. The science of ancient temples as opposed to ecclesiology. DUDLEY, *Naology*, or a treatise on the origin, progress and symbolical import of the sacred structures of the most eminent nations and ages of the world, 8vo., Leicester, 1846.

NAOS (Gr.), see CELLA and NAVE.

NAPHTHA, see BITUMEN.

NAPIER (SIR NATHANIEL), succeeded his father 1673, and nearly re-edified his seat, Critchill house, Dorsetshire, and laid out the gardens. In 1698 he travelled and wrote a

journal containing a particular description of Rome, Naples, and other principal cities of Italy; he subsequently went to Holland and Germany, returning in 1707. He was perfectly conversant with the sciences of architecture and painting, and left behind him several of his own drawings, besides others of value he had collected in his travels. He died in 1708, aged 72 years, and was buried in the nave of the church at Mintern Magna. NEALE, *Seats*, 4to., London, 1818, i, at which time it was the seat of his descendant, Henry Charles Sturt, esq.

NAPKIN PATTERN. In addition to the references under LINEN PATTERN, see VIOLETT LE DUC, *Dict.*, s.v. *Soubassement*, 457: in the portal at Reims, given in GAILHABAUD, *L'Architecture*, etc., 4to., Paris, 1852; BRITTON, *Normandy*; painted in choir of cathedral at Brunswick; PARKER, *Domestic Arch.*, iii, 107; POLLET ET ROUX, *Choix d'edifices*, pl. 31: at Rouen, in *BUILDING NEWS Journal*, 1870, p. 312, 376.

NAPLES, in Italy; see NAPOLI.

NAPLES YELLOW. A compound of the oxides of lead and antimony, anciently prepared at Naples under the name of Giallino. It has been supposed to be a native production of Vesuvius and other volcanoes; and it is a pigment of deservedly considerable reputation. It is not so vivid a colour as patent yellow and turbit mineral, but it is variously of a pleasing light, warm, golden yellow tint; like most other yellows, it is opaque, and in this sense is of good body; it is remarkably heavy and of a dusty surface. It is not changed by the action of light, and may be used safely in oil or varnish, under the same management as the whites of lead, but like these latter pigments also, it is liable to change even to blackness by damp and impure air when used as a water colour, or unprotected by oil or varnish. A palette knife should not be used, as iron is destructive of this colour, which is liable to change if Prussian and Antwerp blues and the ochres be mixed with it, as they contain that metal. It is the common yellow of the painters, and is used in the ground colour for graining. FOURGEROUX, in *Hist. Acad. Sciences*, 1766, gives a recipe for making this colour equal to that manufactured at Naples.

9. 13. 23.

NAPOLEON ROSE MARBLE, see MARQUESE MARBLE; and BOULOGNE-SUR-MER.

NAPOLI (Lat. NEAPOLIS; Sp. NAPOLES; Fr. and Eng. NAPLES; Ger. NEAPEL). The capital of the province of the same name in Southern Italy. It disputes with Constantinople the claim of occupying the most beautiful site in Europe, being built on the north shore of the gulf, which is upwards of 35 English miles in circuit, at the base and on the slopes of a range of hills, which have the general form of an amphitheatre. It is about 4 miles long and $2\frac{1}{2}$ wide. The city suffered severely by the earthquake of 5th June 1688. Its origin was a Greek settlement founded as Parthenope, with another called Neapolis, or new city, when the former was changed to Palæopolis, or old city, situated at the present harbour of porto Piccolo. The ancient remains are very few, and are mostly mentioned in connection with the buildings where they occur. The country around is, however, covered with ruins of temples, theatres, and villas; and the museum is rich in works of art. Ponte Rossi is the modern name of the Aqua Julia, about 50 miles long, constructed by Augustus to supply the Roman fleets at Misenum with water, where one branch of it terminated in the great reservoir, piscina mirabilis. The aqueduct is built of solid masses of tufa lined with red brick; the ruins were repaired in 1843, care being taken to preserve their antique character. The "anticaglia" consist of two arches and other remains of a theatre in the lower or old part of the town. The catacombs of S. Gennaro are excavated in the solid volcanic tufa in the face of the hill, and are arranged in three stories; the galleries, communicating by flights of steps, will admit of six persons abreast, in some places twelve or more. The church of S. Gennaro, of the

eight century, is built on the site of the small chapel in which the body of S. Januarius was deposited in the time of Constantine. The altar, episcopal chair cut in the tufa, and some paintings, are still preserved. At a part closed early in the present century is another church with three arches, supported by columns cut out of the tufa rock, with an altar, episcopal seat, and baptistery.

Naples retains little more of its mediæval fortifications than a few fragments of its wall and ditch, three castles, and a few modernised gates, now within the city. Of these the porta Capuana, the most interesting, was erected by G. da Maiano for Ferdinand I (1458-94) of Aragon, as well as the walls of the city in this quarter: of this date are its two round towers; the modern ornamented gate dates from 1535 (ROSSINI, pl. 79). The porta Nolana is also flanked by two towers. The porta del Carmine has been removed, but its two towers remain. The porta Medina 1640 is by C. Fansaga. The porta Alba or Scinscella, and that of San Gennaro are of little interest. The present walls and the barriers dating *cir.* 1825, were by S. and L. Gasse. The cavalry barracks at porta Maddalena are by L. Vanvitelli.

The porto grande was formed in 1302 by Charles II of Anjou; the molo grande was extended by Alfonso of Aragon (1441-58). At the end of the mole was a fountain by G. Merliano *cir.* 1550, from which the statues of four rivers were taken to Spain. The haven and mole left unfinished by D. Fontana (who died 1607), were continued on his designs by F. Picchiatti to the torre di S. Vincenzo. The lighthouse was erected 1509, destroyed by lightning it was rebuilt 1656, and reduced to its present form in 1843. Charles III in 1740 carried out a pier to the north-east, probably by F. Fuga, converting its whole length into a heavily armed battery. The foundations of the piers for a much more extensive port were laid in May 1862. The porto militare was begun 1826 by Francis I. The dockyard opened 1852, and the arsenal founded 1577 by fra G. V. Casali, adjoin the castel nuovo: the wet dock or *darsena* (attributed also to Casali by MILIZIA) was begun 1668 by B. Presti, a Carthusian, but failing, it was completed by F. Picchiatti; considerable additions have been made of late years. The *granili*, still incomplete, were designed by F. Fuga, *cir.* 1765, to contain a public granary, an arsenal for artillery, and a storehouse for rigging. The granary 1596, on the sea shore near the piazza del Mandracchio, is by D. Fontana. The public granaries near the porta d'Alba 1608 were by S. G. C. Fontana, afterwards enlarged. One of four floors all arched, 1181 ft. long and 55 ft. 9 in. wide, is given in the ALLGEMEINE BAUZEITUNG, 1852, pl. 489-91. The *dogana* or new custom house 1825 is by S. and L. Gasse.

The ponte della Maddalena over the river Sebeto was built by Charles III on the site of the ancient ponte di Guiscardo. The ponte di Chiaia spanning the *strada* of the same name, was built 1634, and rebuilt 1838. The ponte della Sanità was built 1809 by the French; it leads to Capodimonte. The ponte dell'Immacolatella was erected by Charles III (1382-86), and rebuilt 1843 by Ferdinand II.

The *castel nuovo* was begun by Fuccio 1221, completed 1283 by Masuccio I, for Charles I, from the designs 1268 of G. da Pisa, and used as a palace by his successors. Alfonso I (1440-58) enlarged it, but the greater part of the present works is attributed to the viceroy, don Pedro de Toledo, who ordered the square bastions about 1546, probably by Juan de Bautista de Toledo. In 1735 it was reduced to nearly as at present (GIRAUD, pl. 9), except that two of the five round towers were demolished in 1862. The chief object of interest is the triumphal arch (Corinthian), a very fine work of the cinque cento period, erected 1470 by Pietro di Martino (not by G. da Maiano, as in VASARI), in honour of the entry 1443 of Alfonso I into Naples. The sculptures were by Isaia da Pisa, Andrea Fiorentino, and Silvestro dell'Aquila, the three statues (*cir.* 1540) on the summit and two figures are by Gio. Merliano da

Nola (ROSSINI, pl. 80). The bronze gates leading into the piazza were executed at end of 15th cent., by the monk Guglielmo (CICCONARA, ii, 191); around it are the church, barracks, and the buildings of the time of the Angevin kings, in which is the grand hall called the sala di S. Luigi or sala delle armi, used as the principal armoury. The chief entrance (Corinthian) to the church of S. Barbara, *cir.* 1440, is by G. da Maiano; the whole of the interior was remodelled in the 18th century, so that only the façade and spiral turrets show its original Pointed architecture. Behind the choir, the curious winding stairs of 158 or 187 steps lead to the summit of the campanile, by Giov. da Pisa or Guil. da Maiano. The *castel dell' Ovo*, on an island, founded 1154 by William I on the designs of Buono, was continued from a design sent 1221 by Niccolò da Pisa for Frederick II, but completed after 1231 by Fuccio. Charles I added to it considerably: it was reduced to ruins 1495, and probably restored by don Pedro di Toledo (1532-54); it is now a barrack and prison. The *castel Capuano*, founded by William I, was designed by the same Buono 1154-66, and completed 1231 by Fuccio or by Niccolò da Pisa. It was used as a palace by the later sovereigns. In 1540 it was converted by G. Merliano for don Pedro di Toledo, who established here the different law courts, etc.; on the ground and lower floors are cells for many hundred inmates, and called the prisons. The *castel Sant' Elmo*, called Sant' Erasmo in the 14th century, is said to have been founded 1329 or 1343, by Robert the wise. The torre Belforte, its nucleus, was designed by G. de Sanctis, the commission for it still exists (MURRAY): altered 1458-94 under Ferdinand I, when it was called castello di S. Martino, by Georgio da Settignano and Andrea da Pisole. The castle in its present form was rebuilt 1532-54 for don Pedro de Toledo, upon the plans of Pedro de Prado of Zaragoza (LLAGUNA) or of Luigi Scriva or Scrivano of Spain: some additions were made 1641. It is now dismantled and used as a military prison. Beneath it is a large cistern cut in the tufa rock. The *castel del Carmine*, founded 1484 by Ferdinand I, and enlarged by Pedro di Toledo, was fortified after 1647, but is now barracks and prison.

The *villa reale* or *nazionale*, is a favourite promenade along the sea shore, about a mile long and 200 ft. wide, and planted. About half of it was first laid out 1780 in the Italian style, an equal portion 1807, and a third of about 1200 ft. in 1834, by S. and L. Gasse, both the latter in somewhat of the English style. The large granite basin of the central fountain was removed 1825 from Salerno, where it had been brought from Paestum by king Roger. There is also a colossal statue of Vico; and a statue of gen. Colletta. The *strada di Toledo*, since 1870 officially the strada di Roma, the main northern artery of Naples, about 1½ miles in length, was formed 1540 by Giovanni Bautista de Toledo, or also said by G. Merliano da Nola, for don Pedro di Toledo, on the fosse of the old city. In it are the principal shops. The strada di Chiaja 1596-1695, and Sta. Lucia, were laid out by D. Fontana, who put the fountains therein. The strada di Porta Nolana and di Monte Oliveto, are by F. Manlio. The *larghi* or large open spaces or squares are now called *piazze*, of which the largo del Castello or piazza del municipio, the largest in Naples, was formed by D. Fontana. The largo Medina has in it the finest fountain, designed by D. Auria, and altered when removed 1637-44 by C. Fansaga. In the largo di S. Domenico, is an obelisk with a statue of that saint 1657 by C. Fansaga, completed 1737 by D. A. Vaccaro. In the largo del Gesù or S. Trinità a sculptured obelisk called Guglia della Concezione 1747 by Genoio, has a statue of the Virgin in gilt bronze. The colossal bronze statue of Philip IV, by Lorenzo Vaccaro was destroyed by the Austrians about 1720. Near this is the largo di Montoliveto, with a fountain 1668 by Cufaro, having a bronze statue of Charles III. The *guglia* or obelisk of S. Gennaro 1637-60, by C. Fansaga, cost £2,800. There are three foun-

tains in the largo del Mercato. The largo dello Spirito Santo or del Mercatello, contains the memorial erected 1757 in honour of Charles VII, designed by L. Vanvitelli, consisting of a hemicycle of great extent, on which are twenty-six statues representing the virtues of that sovereign. A statue of Dante has been lately put up behind it. The largo del' Pennino or della Selleria contains the fontana dell' Atlante 1532 by Luigi Impò; the statue of Atlas, by G. Merliano da Nola has disappeared, but the dolphins are by him. In the largo del palazzo reale, now del plebiscito, are two colossal equestrian bronze statues of Charles III, by Canova, and of Ferdinand I of Bourbon, by Call. The two bronze horses and statues at the entrance to the gardens were cast at S. Petersburg, and presented by Nicholas I to Ferdinand II: an artesian well in the gardens produces 300,000 gallons of water every twenty-four hours. In the piazza della Pace or piazzi dei Martiri is a marble column, having four colossal lions at the base. Among the many other fountains, are 1541 the fontana Scapellata, and also Coccovara, both by G. da Nola; fontana del Sebeto 1590, and fontana Fonseca, both by Carlo Fansaga; and fontana del Ratto d'Europa, 18th century, by Angelo de Vivo.

The *acqua di Carmignano*, the modern aqueduct of Naples, was constructed early in the 17th century by Aless. Ciminello and Cesare Carmignano at their own expense; it is about 30 miles long; in 1631 and 1770 further supplies of water were added; most of the city fountains and houses are supplied from it. An artesian well near the palace is 1770 ft. deep, and 1458 feet below the level of the sea; the water rises to within a few yards of the surface, but it is a mineral water. Another well in the largo della Vittoria has reached a spring of purer water; both were formed by M. Degousse, a French engineer some years since. MONTICELLI, *Sulla origine delle acque del Sebeto*, 1840; ABATE, *Delle acque pubbliche della città di N.*, 1840.

Naples is the see of an archbishop. The *cathedral* (Gothic), dedicated to the Assumption of the Virgin, is erected on the site of the temples of Neptune and of Apollo, from the ruins of which may have been obtained the numerous granite and marble columns. The present building—lofty towers, ailes, and pointed arches on piers to the nave, and the tribune—date from 1266-99, from designs by N. da Pisa and Masuccio I, continued 1298, and completed 1316: in 1446, being damaged by an earthquake, it was repaired in 1450 by the Donizellis, by the aid of the principal families of Naples, who each built a portion, and had their arms sculptured upon the pillars. The façade, destroyed by an earthquake in 1349, was rebuilt 1407, by A. Bamboccio; modernised 1737 by Raffaele Cappelli; also in 1788, and the interior restored and repaired in 1837-48. The roof and wall above the arches are painted; the font is an antique vase of green basalt, sculptured with Bacchanalian emblems in relief. The façade and interior are given in *ROME, Voy. Pitt.* To the left of the altar is the rich Gothic chapel of the Capece Galeotta family. Under the choir is the richly sculptured subterranean chapel called the Confession of S. Gennaro, built 1497 for cardinal Oliviero Carafa. The roof of marble is supported by ten Ionic columns, seven of which are of cippolino; the decorations and the statue of the cardinal were by Tommaso Malvito. On the right of the choir is the Tocco chapel (Gothic), with the tomb and fresco decorations of S. Asprenus, an early bishop of Naples. The Minutoli chapel with its interesting tomb, *cir.* 1280, are by Masaccio I. The Gothic canopy over the chair of the archbishop Minutoli is a fine specimen of the sculpture of the 14th century, its torse columns and the canopy having no parallel on the north side of the Alps (WILLIS); *Illustrations*, s.v., 1856-57. The Brancia chapel has a fine Gothic canopied tomb of cardinal Carbone, by Bamboccio. The *basilica of Sta. Restituta*, built 334 (the ancient cathedral for the Greek ritual), or founded in the middle of the 7th century, was restored at the end of the 17th, many of the Pointed arches of the nave and the Gothic

chapels of the right aisle being untouched. The chapel of Sta. Maria del Principio, contains a mosaic restored by one Tellus in the 14th century. On the side walls are two curious bas-reliefs which formed part of the ambores or pulpits of the 8th century. The cupola of Giovanni in fonte, formerly the baptistry, is covered with paintings and mosaics of a very early period, in the style of some of those at Ravenna. On the right aisle of the cathedral is the chapel of S. Gennaro, also called the *cappella del Tesoro*, built 1608-37, in the form of a Greek cross, at an expense of 500,000 ducats. The design, chosen in a general competition, was by a Theatine monk, F. Grimaldi; it has been attributed to F. Negro. The magnificent gates, designed by C. Fansaga (the gate 1623-68 also attributed to G. G. de Conforto), were executed by Biagio Monte and Soppa in forty-five years, and cost 32,000 ducats. In the interior are seventeen altars, with forty-two columns of brocatello marble; also nineteen bronze statues of saints; and different pictures painted on copper by Domenichino and Spagnoletto, which were restored 1840 by Andrea della Volpe. The candelabra 1745 are by B. Granucci. The sacristy contains a rich collection. MAZZOCHI, *Diss. Hist. de Cath.*, N., 1751.

Naples is divided into fifty parishes including the suburbs. There are generally said to be about two hundred churches, but there are upwards of three hundred and forty. Those marked * in the following list are described in MURRAY'S *Handbook*. Many of them are of gigantic proportions and generally speaking they are more satisfactory in treatment than those in Rome, and most of them contain objects of the highest interest to the architect as well as to the general traveller. Those marked † at the end, are not noticed in late descriptions.

*S. Agnello maggiore or a Capo di Napoli; founded 1617 (Gothic, but lost almost every trace by alterations).

S. Agostino de' Scalzi, or Sta. Maria della Verità; *cir.* 1620 by G. G. de Conforto.†

*S. Agostino della zecca; founded 1265-84, by Charles I.; restored 1697, by F. Picchiatti. The chancel dates 1761-70 by Gius. Astarita. It has a lofty tower.

S. Andrea Apostolo (Augustinian nunnery); 1678; by padre F. Grimaldi.

*S. Angelo a Nido; 1355, with the library and hospital for cardinal Brancaccio; his tomb 1427 is the joint work of Donatello and Michelozzo, as described in *Gaye, Carteggio*, 8vo., Fir. 1839, i, 117-120, to cost 850 florins. The church was modernised, if not rebuilt, *cir.* 1670, by A. Guglielmelli.

Sta. Anna di palazzo, rebuilt *cir.* 1700, by F. Marinelli.

Sta. Anna della Nazione Lombarda, see Monte Oliveto.

*SS. Apostoli (Theatine); rebuilt 1626-48 by F. Grimaldi, is rich in frescoes and decorations: the high altar 1777 by F. Fuga. The cappella Filomariano is by F. Borromino; the five mosaics by G. B. Calandra, are copies of Guido's work. The Pignatelli chapel, similar to it, is by F. San Felice.

S. Aspremo; 10th cent. by Formicola; restored *cir.* 1290 by Masuccio I.†

*L'Ascensione; rebuilt 1622, by C. Fansaga.

Sta. Barbara, see Castel Nuovo.

*S. Biagio de' Taffettanari; 1723 by G. Lucchesi.

*Sta. Brigida; 1610, contains the tomb of Luca Giordano, buried 1705, who painted the frescoes in the cupola.

*S. Carlo all' Arena; 1602, by G. Nuvoletti; restored 1836 by Francesco de Cesare; the painting of S. Carlo by Giuseppe Mancinelli is one of the finest works of the modern Neapolitan school.

S. Carlo Borromeo, see Monte Oliveto.

*S. Caterina a Formello, rebuilt 1523 by A. Fiorentino, called della Cava, has a cupola after that of Florence.

S. Caterina di Siena; 1742, by M. G. Gioffredo, with nunnery and cloister.†

*S. Chiara; 1310, was almost rebuilt 1318-28 by Masuccio II. The interior 270 ft. by 104 ft. has no aisles; the chapels and nuns' galleries have encroached upon the space. The church was renovated 1752-3, under the direction of an engineer, Giov. del Gaizo, when the elaborate ornamentation cost 100,000 ducats. It was restored 1833 by N. Montella. The tombs (Gothic) of the princes of the house of Anjou are valuable monuments in the history of mediæval sculpture; among them is that of king Robert the wise, died 1343, by Pannico (Baccio) and Johannes; also attributed 1350 to Masuccio II; also that of Charles duke of Calabria, 1382, engraved in CROONARA. The pulpit is the work of the 13th century; the bas-reliefs in front of the

gallery over the entrance, are fine 14th century work: the high altar, *cir.* 1625 is by C. Fansaga. In the church are four fine columns, said (1691) to have been brought from the temple at Jerusalem (Acron, p. 20).

The monastery adjoining is of immense extent, having accommodated 400 nuns of the order of S. Clare: the vast hall is now occupied by shops. Of the CAMPANILE, 1328, the ground story is stated to be by Masuccio II, or by his disciple G. di Sanctis (*ob.* 1435, and his works Gothic); but G. da Majano took the Renaissance style to Naples, and this is a very early specimen of it: it is stated that the Doric order was added in the 15th century, and the Ionic (which has angular capitals) in the early part of the 17th cent.; but D'AGINCOURT says both were added in the beginning of the 17th century: it was finished between 1617 and 1624. It is 65 ft. 4 in. French at bottom of its spreading base. LECLERE, pl. 8. *Illustrations*, Campanile, i, pt. 2, pl. 13.

Sta. Croce, near that of S. Agostino; enlarged after 1384, by A. Ciccone.†

Della Concezione detta di Monte Calvario; *cir.* 1700, by D. A. Vaccaro.†

Della Croce di palazzo; 1327 by G. de Sanctis.

Del Divino Amore; by F. Picchiatti.†

*S. Domenico Maggiore (Gothic) 1285-9 by Masuccio I; repaired 1450, after the earthquake of 1446, by A. Novello de S. Lucano; and by D. A. Vaccaro, and others in the 17th and 18th centuries, including a flat roof. Between 1850-53 it has undergone an extensive restoration, and is one of the most richly decorated churches in Naples. It has a nave and side aisles, and seven chapels on either side, which are filled with works of art: among these are the fine Gothic tombs of members of the Aquino family, dating from the middle of the 14th century. The transepts are short. The high altar is a great specimen of Florentine mosaic 1652 by C. Fansaga, having two seats on either side, and two fine columns of verde antique supporting candelabra.

Donna Alvina, monastery of; cupola of church by F. San Felice.†

*S. Eligio Maggiore, 1270; a fine portico and entrance of Angevine Gothic, interior modernised. A good Gothic tomb to Bonetus, 1341.

*S. Felippo Neri, or church of the Gerolomini or Gelormini; 1692-1610, by Dionisio di Bartolommeo: the façade, cupola, and high altar were by his pupil D. Lazzari; the former was altered and covered with marbles in the eighteenth century, by F. Fuga; its statues are by San Martino. A nave 36 ft. 6 in. French, and two aisles, each 15 ft. 7 in. wide, divided by twelve Corinthian columns 2 ft. 4 in. diam., of grey granite support a flat roof. The chapels are about 10 ft. deep. The cupola is about 35 ft. 6 in. diam. The whole is loaded with an excess of ornament. The rich chapel of S. Felippo Neri on the left of the choir, the great chapel on the gospel side, of white and yellow marble, and the chapel of the Epiphany, are by G. Lazzari. That of the Ruffo Scella family having fluted Corinthian columns, is by Pietro Bernini, father of L. Bernini. The vast monastery was erected 1586-97, by D. d' Bartolommeo; the dwellings and two cloisters were altered by D. Lazzari. The library was built *cir.* 1670 by M. Guglielmelli. The plan is given in RONDELLET, *L'Art de Bâtir*, pl. 75. A plan and part section by Lenoir, in LECLERE, pl. 92.

S. Ferdinando, formerly S. Francisco Xaverio; 1622; enlargement and façade 1628 by C. Fansaga.

S. Francesco Xaverio; see S. Ferdinando.

*S. Francesco di Paolo; 1817-24, by cav. P. Bianchi, in imitation of the Pantheon; the dome is stated as 136 palmi, or 116 ft. diam. The façade has an Ionic portico of six columns and two pilasters of Carrara marble (ROSSINI, pl. 81). The interior, 175 ft. high, is covered with costly marbles, and has thirty-two Corinthian columns of Mondragone marble, of which material the confessionals are also made. The high altar designed by F. Fuga, and brought from the church of SS. Apostoli, is of jasper and lapis lazuli. The two columns near it are of a rare Egyptian breccia, and were taken from the church of S. Severino. The paintings and sculptures are all by modern artists. A double gallery runs round the church at the base of the drum of the cupola.

S. Gaudisio; *cir.* 1625, sides and staircase by C. Fansaga.†

S. Gennaro; see Catacombs.

De Gelormini (Girolomini); see S. Felippo Neri.

*Gesù Nuovo (lately Jesuit); 1684, in the palace of Roberto Sanseverino,



- prince of Salerno, by Pietro Provedo. The stonework of the façade is built in diamond fashion (GIRAUD, pl. 16). A nave and choir, each of two bays, with short transepts; the cupola by A. Novello de S. Lucano, was destroyed by the earthquake of 1688, and not yet replaced. The walls and pillars are covered by a variety of coloured marbles, and resemble those of a ball room. The chapel of S. Ignazio, and the high altar of the church, are by C. Fansaga.
- Gesù vecchio; middle of sixteenth century, and with the college, a fine work, by Marco da Pino. The chapel of S. Francesco Xaviero, and the staircase, *cir.* 1625, by C. Fansaga. Since 1780 it has been occupied by the university.
- De' Gesuiti; by F. San Felice.†
- *S. Giacomo degli Spagnuoli; 1540 by G. Merlano da Nola, assisted by F. Manlio; or by Juan Bautista de Toledo (LLAGUNO). Three aisles and fourteen chapels. The tomb of don Pedro de Toledo 1554 is the masterpiece of G. Merlano; the sculpture and decorations are in the best taste.
- ~ Giorgio de' Genovesi; by G. Merlano da Nola; or 1520 by F. Picchiatti.
- S. Giorgio Maggiore; 1640, begun by C. Fansaga; continued *cir.* 1650, by Pietro di Marino.
- *S. Giovanni a Carbonara; (opening out of a forecourt approached by a flight of steps, designed by F. San Felice), 1344 was by Masuccio II, or his pupil G. de Sanctis; restored and enlarged 1399-1414 for king Ladislaus, by A. Ciccone, who executed the tomb 1414 for him; it is considered the masterpiece of that artist, and is as high as the church itself. The cappella dei Miroballi is by an unknown artist of the 15th century, and contains the richly decorated tomb of Trojano Miroballo. The fine chapel of the marquis de Vico is by Pedro de Prato de Zaragoza (noticed by LLAGUNO). The circular chapel of the Caracciolo family 1432 is by A. Ciccone or Santa Croce. The presses in the sacristy, formerly the Somma chapel, are of walnut wood, and designed by G. Vasari. The chapter house is covered with frescos. The convent of S. Augustin, founded by the same king, has been suppressed. A staircase and the library are by F. San Felice.
- *S. Giovanni Evangelista (cappella); 1402, from an old design of A. Ciccone, by the poet Pontano; it was restored 1759 for king Carlo VII.
- *S. Giovanni Maggiore, on the site of a temple to Antinous, erected by Hadrian; was built 1290 by Masuccio I; rebuilt 1635 by C. Fansaga; reduced 1685 to its present form by D. Lazzari; part of the church has lately fallen down.
- S. Giovanni fuori porta Alba; by F. Picchiatti.†
- *S. Giovanni de' Pappacoda, 1415, and its elaborate Gothic portal by A. Bamboccio; the belfry is of the same date. The interior is modernised. *Illustrations*, s.v. Corbel Table, 1857-8, pt. 2.
- S. Girolamo delle monache; modernised by F. Picchiatti.†
- S. Giuseppe Maggiore; *cir.* 1600, by G. d'Agnolo.
- S. Giuseppe de' Ruffi; 1682, by D. Lazzari.†
- *S. Giuseppe à Chiaja, a small church, has a chapel built by Lady Holland, with a tomb to lord Holland, who died 1859 in Naples.
- S. Giuseppe à Pontecorvi. The atrio, church and convent of Theresine nuns, *cir.* 1625, by C. Fansaga.†
- *S. Gregorio Armeno, also called S. Liguoro, on the site of a temple to Ceres; Benedictine nunnery; was 1572 removed or rebuilt by V. della Monica, and the church 1574 by G. B. Cavagni. It is preceded by a deep portico, over which, in the interior of the church, was the gallery for the nuns. It is considered one of the best churches in the city.
- *L'Incoronata (Gothic, groined roof and some chapels); 1347, the cappella di Giustizia being incorporated with it, built for Charles II (1264-1309). Only the nave and left aisle exist. There are good frescos by Roberto di Oderisio, formerly supposed to be by Giotto. *ALOE, Les peintures*, 4to. Berlin: some are given in ILLUSTRATED LONDON NEWS, 1856, xxix, 299.
- S. Liguoro; see S. Gregorio Armeno.
- *S. Lorenzo, on the site of the basilica Augustalis, where the senate of Naples held their assemblies; 1266, by fra Tommaso da Terracina; the church by il Maglione, and completed 1324 by Masuccio II; his pupil G. de Sanctis erected the vast arch which separates the nave from the crossing. The façade is attributed to F. San Felice. Little of the Gothic is left beyond the great marble doorway (said to be by A. Ciccone), and the ambulatory with chapels which surround the choir, and are fine specimens of the period: a window in the chapter house is also remarkable. The tomb of Catherine of Austria, first wife of Charles, duke of Calabria, is by Masuccio II, who executed others adjoining it. A good detached campanile of four stories and belfry. The gothic cloister has been modernised in Spanish taste; on its east side is a large Gothic chapel or hall, its Pointed roof supported by Italo-Gothic piers. In the cloisters is the tomb of Ludovico Aldemoresco 1414, by A. Bamboccio, and remarkable for its bas-relief.
- S. Luigi di palazzo; chapel, sacristy and staircase, by L. Vanvitelli.†
- Madre di Dio; *cir.* 1600, by G. G. Conforto.†
- SS. Marcellino e Feste, 1626-33, by P. d'Apuzzo.
- S. Marcellino, by L. Vanvitelli.†
- *Sta. Maria degli Angeli (Theatine), built 1600, by F. Grimaldi, is considered by MIZUZA the best proportioned church in Naples; the façade 1635, by C. Fansaga, to whom is also attributed the church, atrio and monastery: while the monastery alone 1658 is attributed to G. Guarini, a pupil of F. Grimaldi.
- Sta. Maria dell' Ajuto; 1684, by D. Lazzari.
- *Sta. Maria dell' Annunziata; *cir.* 1540, by F. Manlio; burnt 1757, with the exception of the sacristy and treasury; then rebuilt 1782, by L. Vanvitelli, is one of the best of the style in Naples. There are forty-four Corinthian columns of Carrara marble partly sunk in the walls. Adjoining it is a foundling hospital, and a magdalen hospital.
- Sta. Maria al Borgo delle Vergine; by F. San Felice.†
- Sta. Maria a cappella; *cir.* 1635, by P. di Marino.†
- *Sta. Maria del Carmine (Carmelite); traces of the Gothic style remain in the groined roof of the choir and transept; the interior otherwise was modernised during the Spanish rule. The altar and tribune 1672, by C. Fansaga, were completed 1682 by the Mozetti. The lofty campanile was designed by Conforto as far as the third story, and finished by Fra. Nuvoletto.
- Sta. Maria a Colonna; 1715, modernised by A. Guidetti.†
- *Sta. Maria della Catena; 1576.
- Sta. Maria Egiziaca, or di Pizzofalcone; *cir.* 1500, by G. d'Agnolo; and 1648 by D. Lazzari. The atrio and staircase by M. Guglielmelli, from designs of B. Picchiatti.
- Sta. Maria del Gesù (nunnery); *cir.* 1670, by A. Guglielmelli.†
- *Sta. Maria delle Grazie a capo Napoli; *cir.* 1450, by G. de Sanctis; it has only a nave. Two chapels contain the two rival bas-reliefs of Giov. da Nola and Santa Croce.
- Sta. Maria Maggiore or La Pietra Santa; 1654-67, is by C. Fansaga; esteemed one of the finest churches in Naples.
- Sta. Maria Maddalena; façade by N. Falcone.†
- Sta. Maria de' Monti; 1607, by C. Fansaga.†
- Sta. Maria di Monte Santo; 1646, by P. di Marino.†
- *Sta. Maria la Nuova (Franciscan), on the site of the ancient torre Mastraria; 1268, by G. da Pisa, completed by Masuccio I. It was rebuilt 1596-99 by Il Franco, and consists of a nave with twelve chapels, and two in the transepts. The tomb of Galeazzo Sanseverino, is a fine work of the fifteenth century. The large chapel of S. Giacomo della Maria, with seven altars, was erected before 1528.
- *S. Maria del Parto, or di Sanuazzaro or Sandrussa; built by the Servite monks after retirement (*cir.* 1516) of S. Sannazzaro the poet (died 1530) from Naples; his tomb, a fine work by Gir. Santa Croce and Fra Giovanni da Montorsoli, was erected by his executors.
- *S. Maria del Pianto; 1656, over the victims of the plague.
- *Sta. Maria di Piedigrotta; dates 1353, according to local tradition.†
- *Sta. Maria della Pietà dei Sangri, or capella di Sansevero; 1604-13 by G. Conforto. It is the family chapel of the dukes of Sangro. It was reduced to the present form 1766, by Raimondo di Sangro, who decorated it with marbles, rich cornices and capitals from his own designs. Under each arch is a tomb.
- *Sta. Maria donna Regina; rebuilt 1620 by fra G. Guarini, has a wide nave and four chapels on either side, the brass and iron railings to which are of very good design. It was attached to a convent of nuns, built before 1323.
- Sta. Maria Regina Coeli; 1563 by G. F. Mormando; restored and the lower half of the middle campanile entirely underpinned by F. San Felice. The carved work 1590 by I. Nardo.
- *Sta. Maria della Sanità; *cir.* 1575, by fra Nuvoletto, has a subterranean church under the altar.†
- Sta. Maria della Sapienza (Dominican nunnery); 1607, by F. Grimaldi; façade and steps by C. Fansaga.
- Sta. Maria della Verità; see S. Agostino de' Scalzi.†
- Sta. Maria de Vertice Coeli, rebuilt 1734 by B. Granucci.†
- *S. Martino, the certosa or Carthusian monastery, begun 1325 by Cino di Cenis with F. de Vito, but attributed to G. de Sanctis; the church, rebuilt and reduced to its present form, *cir.* 1640 by C. Fansaga. The marble mosaic pavement is by Presti, a carthusian. The interior is perhaps one of the most splendidly decorated in Europe, being of coloured marbles, forming a Florentine mosaic on a large scale. A nave and five chapels on each side of the church. Behind the altar, designed by Solimena, and behind an open work marble screen is the choir, which is rich in works of art by Guido, Spagnoletto, and others. The sacristy is equal to the church; the presses are fine tarsia work with carved reliefs; the chapter house is also good. The cloister is a quadrangle having sixteen white marble columns on each side (total 60), and with statues of saints by C. Fansaga and D. Vaccaro, *cir.* 1650. The monastery, formerly a hospital, is now a succursale of the museum.
- S. Michele arcangelo; by D. Vaccaro.†
- De' Miracoli; *cir.* 1600, by F. Picchiatti.†

*Del Monte della Misericordia, 1605, by F. Picchiatti; it is octagonal with seven altars.

*Monte Oliveto, or Santa Anna de' Lombardi, now S. Carlo Borromeo; and its once splendid Benedictine monastery; 1411, by A. Ciccione; it has only a nave. The fourth cloister 1613 is by G. G. de Conforto, finished 1679 by M. Naclerio. It is now occupied by the municipality, and the convent garden being turned into a market. The church, having six chapels on each side the nave, with the choir, were almost rebuilt 1581, and modernised 1613. It is a museum of sculpture, but its architecture ruined by restoration during the Spanish rule. The chapel, by D. Fontana, on the right of the door, contains his tomb; he died 1607 at Naples.

Monte Virgine; by D. Vaccaro.†

S. Niccolò alla Carità, called S. Nicolliello; commenced by O. Gisolfi or Gisolfi; it was continued 1678 by C. Fansaga.†

S. Nicola a Nilo; 1705, rebuilt by G. Lucchesi.

La Nunziatella at Pizzofalcone; by P. San Felice.†

*S. Paolo maggiore, also S. Gaetano (Theatine), on the site of a temple to Castor and Pollux, erected by Tiberius Julius Tarsus, prefect of Augustus, of which two Corinthian columns with a portion of the architrave stand out from the modern façade. There are bases of others and two torsos. It was modernised 1591, by padre Grimaldi. The interior is highly decorated with inlaid marble work. The sacristy is a fine hall with numerous frescos. The cloister, which is said to stand on the site of the ancient theatre in which Nero appeared as a comic actor, has twenty-four Doric columns of granite, which probably belonged to it.

*S. Pietro ad Aram (Franciscan), by P. di Marino and the Mozzetti. In the subterranean church is the tomb of Sta. Campeda, and a well.

*S. Pietro a Maiella (Celestina); before 1316, a high Gothic nave and aisles and two fine arches at the transepts, which are short: the architecture spoiled by restorations in 1608 and 1840, and by sculpture placed on it. The monastery is now converted into the Conservatorio or Collegio di Musica.

*S. Pietro Martire (Dominican); founded by Charles II of Anjou (1284-1309) was entirely remodelled in the eighteenth century, by G. Astarita. The cappella del Rosario was decorated by B. Granucci, cir. 1730. The large monastery is now the government tobacco factory.

*SS. Pietro e Paolo; founded 1518, is a Greek church.

S. Polito; the church of the convent rebuilt by G. B. Broggia.†

Della Rotunda, by L. Vanvitelli.†

Rosario al Largo delle Pigne; cir. 1670, by A. Guglielmelli.†

Sta. Restitua, for the Greek ritual; see the cathedral.

Della Sapienza; cir. 1625, by C. Fansaga.†

*SS. Severino e Sossio (Benedictines of Monte Casino); 1490, enlarged and modernised by G. F. Mormando; its cupola 1573 by his pupil S. di Giovanni, was one of the first erected in Naples: it was painted by P. Schenphen of Florence. A wide nave with seven chapels on each side. The high altar, cir. 1625, by C. Fansaga, is a rich example of Florentine mosaic; and the stalls of the choir are magnificent specimens of wood-carving, the finest in Naples, and in the style of those in the choir of S. Pietro dei Casinesi at Perugia. The three tombs 1516 of the Severini are by G. Merliano. A crypt is under the altar. The extensive monastery has been converted into the general archives of the kingdom. A cloister, cir. 1625, and the refectory, 260 ft. long and 62 ft. wide, by C. Fansaga. The third or smaller cloister of the Ionic order, by A. Ciccione, cir. 1430 (ob. 1455, by his pupil A. Aniello), contains the twenty famous frescos illustrating the life of S. Benedict.

S. Severo; see Sta. Maria della Pietà.

S. Severo for the padre Conventuali; 1681, a Greek cross, by D. Lazzari.

Della Stella; cir. 1500, by G. F. Mormando at his own expense.

Lo Spirito Santo; 1569 by S. di Giovanni. A. Falcone designed the high altar; also said to be 1600, by G. S. Moccio or Moccia, of which only the door flanked by two columns remains; the façade and cupola rebuilt 1774 by M. G. Gioffredo. (GIRAUD, pl. 1).

*S. Teresa; about 1600 by G. G. Conforto. In the garden of the monastery was discovered a few years since an ancient burial place, described by GRUTINIANI as Greco-Roman.

*S. Teresa; façade and steps only, 1650-62, by C. Fansaga.

Trinità Maggiore, see Gesù Nuovo.

S. Trinità, now the ospedale della Trinità.

S. Trinità di palazzo; modernised by M. di Pino.†

S. Trinità of the Franciscans; by F. Fuga, the finest church in Naples.†

B. Vergine Assunta; see Sta. Maria la Nuova.

A plan of a convent and of the monastery of S. Januarius (S. Janvier), by Lyon in LECLERE, pl. 108. *Facciata delle Chiese e palazzi più cospicue*, etc., 4to. MAZZUOLI, *In vetus marmoreum S. Eccles. Neap.* 4to., 1744. CARACCIOLI, *De sacris eccles. Neap. mont.*, fol., Nap., 1623 and 1645. STEFANO (P. di), *Descr. di luoghi sacri*, 4to., Nap., 1560. The English Protestant church (Gothic, with nave and aisles), 1862-4, is by Thomas Smith and Son of London. The walls are built of different coloured tufo from Sorrento. Plan and views in *BUILDER Journal*, xxi, 756, 773.

ARCH. PUB. SOC.

The *campo santo vecchio* built 1762-3 at Trevici, by F. Fuga, with the chapel and residences, is used only for those who die in hospitals and for the poorer classes. The burying ground, upwards of 300 ft. square, is surrounded on three sides by a lofty wall, and on the fourth by an arcade. It contains 366 deep pits, each covered with large stones; one of them is opened every evening, and cleared out to make room for the dead. The *campo santo nuovo* was begun during the French occupation, and remodelled in 1837, when the entrance was designed by S. and L. Gasse: it resembles a flower garden. The church is of the Doric order; and behind it is a large oblong square surrounded by a portico of fluted Doric columns, out of which open one hundred and two proprietary chapels, beneath which are the family vaults of the owners. There are also dotted about, a number of vaults belonging to confraternities or burial clubs. A capuchin convent is attached to the cemetery. In the Protestant cemetery is buried Sir W. Gell.

The houses of the city are large and not less than five or six stories high with flat roofs, which form promenades and gardens; the windows have balconies, tending—in most of the streets from their general narrowness—to exclude the light and air. The *pietra forte*, with which Naples is entirely paved, is a lava of a dull grey or dark brown colour, and this deep tone contributes to the excessive midday heat.

The palazzo reale, now vecchio, was designed 1535 by G. Benincasa with F. Maglione, assisted by F. Manlio in the erection of the third cortile, destroyed for the wing executed 1600 by D. Fontana, which is considered his masterpiece; it is 520 feet long, with three orders; the lowest, Doric, formed an open portico with three entrances flanked by columns of granite from the Isola del Giglio, but many of the arches have been walled up to give solidity. There are twenty-one windows on each of the upper floors. The hall and grand staircase were reconstructed 1608-51 by F. Picchiatti, and recently restored with great magnificence. The palace was decorated 1808-15 for Murat, king of Naples, by E. C. Leconte. Being in 1837 partly destroyed by fire, it was repaired and enlarged. A plate nearly 4 ft. long, showing the elevation, was published by Fontana, in 1606; plan in DURAND, *Parallele*, fol., Paris, 1843; elevation in GIRAUD, pl. 12. The palazzo reale di Capodimonte, was carried out 1734-59 from the designs of Juan Medrano, by A. Carasale. It is a vast rectangle enclosing three large courts. In 1806 it served as a museum, and in it is now the armoury, etc. The plan by Goury is in LECLERE, pl. 72.

There are a number of private palaces of no architectural merit; in the following list those marked * are noticed in the *Handbook*; others have probably had their names changed; and some may be no longer existing.

*Pal. Angri; 1773, by L. Vanvitelli, completed by his son Carlo.

*Pal. Arcivescovale; cir. 1270-1324 by Maglioni, also attributed to Masuccio I; and 1647 almost rebuilt. Doorway of the *vescovo* 1407 by A. Bamboccio; restored about 1770.

Pal. d'Avalos in piazza del Vasto; cir. 1770 remodelled by M. G. Gioffredo; it is one of the largest modern palaces.

Pal. Avellino; by G. de Sanctis; part rebuilt larger 1616.

Pal. Bartolommeo da Capua; by A. Ciccione.

Pal. del Balzo; see Petrucci.

Pal. Calabritto a Chiaja; great gate, staircase, and other works of completion, by L. Vanvitelli.

Pal. Caraccioli or Santobuono; cir. 1450, by the Donzelli.

Pal. Carafa; 1512, now barracks.

*Pal. Carafa; the façade and beautiful cornice added (1555-60) by Pope Paul IV; lower part now shops.

*Pal. Caramanica; cir. 1765 by F. Fuga; a very large building.

*Pal. Casacalenda; 1770 by L. Vanvitelli; in the courtyard are elliptical arches supported by marble columns and pilasters, much admired (GIRAUD, pl. 8).

Pal. Casoli; cir. 1400, attributed to A. Ciccione.

Pal. Castelluccio; 1500 by G. F. Mormando, since much altered.

Pal. Cavalcanti; 1762 by M. G. Gioffredo, who also designed Pal. Campolieto, and Pal. Casacalenda.

Pal. Cellamare, see Francavilla.

- *Pal. Corigliano, formerly Filomarino (Doric); *cir.* 1500, by G. F. Mormando. Upper part rebuilt after the earthquake of 1688.
- Pal. Coscia; *cir.* 1600 by G. F. Mormando; repaired 1746, and the façade and Ionic gateway, by M. G. Gioffredo.
- Pal. Cuomo; *cir.* 1450 by Agnolo Aniello del Fiore.
- Pal. Ercolense, formerly Riccio; *cir.* 1400, by A. Ciccione (GIRAUD, pl. 5). See Marigliano.
- Pal. Filomarino; afterwards Corigliano, *s.v.*; see also Giusse.
- *Pal. Fondi, formerly Gensano at fontana Medina; *cir.* 1770 by L. Vanvitelli.
- *Pal. Francavilla, formerly Cellamare; restored to its present castellated form at the beginning of the 18th century. A public chapel therein, by F. Fuga.
- *Pal. Galbiati, formerly Petrucci and Balzo; *cir.* 1350 by G. de Sanctis; perhaps *cir.* 1450, by A. Aniello del Fiore, to whom the fine marble gateway is attributed. It was the residence of the secretary of Alfonso I. Altered 1695.
- Pal. Giordani; *cir.* 1763, by F. Fuga.
- *Pal. Giusse, or della Torre (Composite); 1549 by G. Merliano; rebuilt *cir.* 1650 by cardinal Filomarino.
- *Pal. Gravina, at close of 15th cent., by G. d'Agnolo, for duke of Gravina, is still the finest as a work of art (GIRAUD, pl. 25); the attic above the fine old cornice and the Doric gallery, are modern. Afterwards called Ricciardi, and is now the general post and telegraph offices.
- Pal. Lieto; 1794 by Pompei Selicantarelli.
- *Pal. Maddaloni, formerly del Vasto; the steps, portal, and staircase, *cir.* 1625, by C. Fansaga; a finely proportioned hall. It is now the *banca nazionale*.
- Pal. Majo, with geometrical stairs, *cir.* 1700, by F. San Felice.
- Pal. Marigliano, formerly della Riccia; *cir.* 1430, began by A. Ciccione and completed in the 16th century. Shops now occupy the basement of one of the most elegant palaces in the city.
- Pal. Marotti, now..... near château d'Ovo (GIRAUD, pl. 7).
- *Pal. Miranda; 1780 by G. Barba, now belongs to the prince of Ottajano.
- *Pal. Miroballo; 1462 by A. Ciccione (ob. 1455), but probably by A. Aniello his pupil; the entrance, covered with arabesques and trophies, only remains.
- Pal. Monteleone; *cir.* 1728, additions by F. San Felice.
- Pal. Montemiletto; *cir.* 1825 by S. and L. Gasse; a large building.
- *Pal. Monticelli, formerly Penna; 1406, attributed to A. Bamboccio; the façade of the ground floor is still decorated with the lily of Anjou, and the pen of its founders A. and O. Penna, privy councillor and secretary to king Ladislaus (1386-1414). It contains collections of mineralogy and geology.
- *Pal. de' Municipio; 1819-25 by L. and S. Gasse; it covers nearly 200,000 square feet of ground; and contains 6 courts, 846 apartments, and 40 corridors; the exchange or *borsa* forms part of the ground floor. It cost about 1,500,000 ducats.
- Pal. Penna; see Monticelli.
- Pal. Petrucci; see Galbiati.
- *Pal. Pianura, built for G. de Scortiat, favourite of Ferdinand I. of Aragon; afterwards the residence of Marini, the poet. The marble doorway and wooden gates are richly carved in arabesques.
- Pal. Regina; *cir.* 1500, by G. F. Mormando; portal and additions at end of 17th cent.
- Pal. Riccardo; see Gravina.
- Pal. Riccio; see Ercolense and Marigliano.
- *Pal. Rucella; belongs to the Carafa family.
- Pal. Salviano; restored, *cir.* 1728, by F. San Felice.
- *Pal. Sanfelice; 1728 by F. San Felice for his own residence; it is remarkable for the double staircase.
- *Pal. Sansevero, *cir.* 1540 by G. Merliano, and remodelled in the 18th century. Subdivided about 1850, into small residences.
- *Pal. Santangelo; begun in 13th century, by Masuccio I; restored 1469 for D. Carafa, count of Maddaloni, of which period are the sculptures of the marble doorway, by A. Aniello del Fiore, as well as the original wood doorways. The palace was restored 1813 by the marquis Santangelo.
- Pal. Serra Cassano; *cir.* 1700 by F. San Felice, and its stairs, the most noble and commodious in Naples.
- Pal. Spagnuolo; 1728 by F. San Felice, with double geometrical stairs.
- Pal. S. Teodoro; 1826 by cav. Bechi.
- Pal. del Vasto; see Maddaloni.
- The villa Lucia (Floridiana), and villa Gallo or Regina Isabella 1809 are both by Niccolini. Villa Jaci at Resina by F. Fuga; one for lady Drummond 1825 by S. and L. Gasse: another by them for duca di Teramo. A palace was begun by G. GIULIANO da San Gallo 1498 for Ferdinand I, near Castel Nuovo.

Among other illustrations of this city, the entrances and staircases of two of the palaces are given by Corbin in *LECLERE*, pl. 58; four others on pl. 68; another and a palace

by Secretan, pl. 69. An ancient portal near the arcivescovado is given in *Illustrations*, Façade, 1848-49, pl. 1.

The museum, known as the *Studii*, was first erected 1577-86 by S. G. C. Fontana, for a cavalry barrack, remodelled 1615 by him, used for the university from 1688, in 1767 restored by San Felice; other works by F. Fuga and Schiantarelli; and 1790 completed by F. Maresca and A. Bonucci, both of Naples, for pictures and antiquities; after the restoration of the Bourbons it received the name of Museo reale Borbonico, and now the museo Nazionale. It is here the priceless collection of frescos and works of art from Pompeii and Herculaneum have been deposited; here are also the picture galleries. The edifice is 490 ft. long, 240 ft. wide, and built of red brick with great solidity. The library in the middle saloon on the first floor, is about 170 ft. long and 70 ft. wide, having fourteen small rooms in the south-east wing, containing upwards of 400,000 books and 500 MSS. Each of the two floors is about 40 ft. high, and there is supposed to be another story above them. A view of the staircase is given in *ARCHITECT Journal*, 1849, i, 305. The contents of this building are illustrated in *Il Real Museo Borbonico*, 17 vols., 4to., Naples, 1824, etc.; and WRENCH, *Recollections*, being plates therefrom, 4to., Lond., 1839. A plan is given in *BUILDER Journal*, 1863, xxi, 188, from dimensions taken about 1830 by S. Loat and Jno. B. Atkinson: each floor is shown in MURRAY'S *Handbook*; and a plan by Tessier in *LECLERE*, pl. 67, which also gives the plan of probably the Society of arts, science, and antiquities. The biblioteca Brancacciana founded 1675; the biblioteca dell' università founded 1823, with collections from suppressed monasteries in 1873, had 140,000 volumes; the biblioteca dei Girolomini founded 1720, belongs to the Order of S. Felippo Neri; the biblioteca del Municipio is open in the evening. The archives are kept in the monastery of SS. Severino e Sosio. The university, see church of Gesù vecchio; and new halls have been built to receive the natural history collection. The conservatorio or collegio di musica, founded 1637, is since 1826 in the monastery of S. Pietro a Maiella, and has a small theatre. The Chinese college founded 1732 by father Ripa, is now the reale collegio Asiatico; *VIEUSSEUX, Italy, etc., in the Nineteenth Century*. The exchange or *borsa* is in the palazzo del Municipio. The general post and telegraph offices are in the palazzo Gravina. The *banca nazionale* is in the palazzo Maddaloni. The botanic garden was founded 1809-18. The reale osservatorio di Capodimonte, called *la specola* (Doric), 1812-20, by S. and G. Gasse, was finished on the plans of the astronomer Piazzi: a drawing by J. Goldieutt is in the library of the Inst. of Brit. Archs.

There are at least sixty charitable foundations, including twelve hospitals; among which the Santa casa degl' Incurabili, founded 1521, has sometimes not less than 2000 patients, besides others sent to convalescent establishments belonging to it in the suburbs: the cemetery, church, and priest's house were by F. Fuga. The ospedale di Gesù Maria is a new one. The della Trinità was formerly the monastery of the same name: the church 1620 was built by F. Grimaldi, and the façade, vestibule, and other works by C. Fansaga, *cir.* 1660. Del Sacramento was formerly a Carmelite monastery. Di Sta. Maria delle Pace, its church dedicated to the assumption of the Virgin, *cir.* 1650, by Pietro di Marino. The albergo de' Poveri or Reclusorio, a vast building, was begun 1751 by F. Fuga for Charles III; it was to have been one-third of a mile in length, to have a church, and four large courts with fountains, but not more than three-fifths of the design have been completed. It accommodates about 3000 poor. Plan by Chablain in *LECLERE*, pl. 51. The lunatic asylum is in a former monastery at Aversa, six miles distant. Il monte de' poveri Bisognesi, is by F. Picchiatti. Il monte and banco della Pietà, 1598, is by G. B. Cavagni.

The teatro di S. Bartolommeo 1649, the first theatre, was

pulled down when the teatro reale, detto di San Carlo, was erected 1737, opened November 4th, having been built in eight months by A. Carasale, from a design by Juan Medrano: it is one of the largest buildings dedicated to the Italian opera; there were seven rows of boxes. Burnt in 1816, it was rebuilt in seven months by Niccolini; the form not altered. It is given in DUMONT, *Salles de spectacle*, fol., Paris, 1774; and seven sheets of drawings of it by H. Parke, 1822, are in the Royal Inst. of Brit. Archts. De' Fiorentini is the oldest in the city, having been erected in the time of the viceroy Oñates, for Spanish comedy; it was restored 1773 by F. Scarola. S. Ferdinando, 1791, is the fourth large theatre. Nuovo 1724, by A. Carasale (or by D. A. Vaccaro MILIZIA); burnt March 1861. Del Fondo 1778 by F. Securo, a military architect, is a miniature of San Carlo. Della Fenice 1806; and San Carlino 1770.

In the immediate environs are the following noticeable works and buildings: Lucullus (77-56 B.C.) chose his abode on the coast of Posilippo, and lavished the riches of Asia in executing stupendous works. A great portion of his villa was discovered 1830-49, equalling a city in its vast extent. A tragic theatre and an odeon have been excavated; and a subterranean viaduct or grotto reopened, which is higher and longer than that leading to Pozzuoli; FALKENER, *Museum*, etc., 8vo., London, 1860, i, p. 288. The grotto di Pozzuoli or di Posilippo, is a tunnel cut in the older volcanic tufa, first formed by Lucullus, it is now 750 yards long, 22 ft. wide, 25 ft. high at the east entrance, and 69 ft. in the centre. It was enlarged by king Alfonso I (1434-69), who formed the two circular ventilating shafts: paved in the 16th cent.; restored cir. 1560 by F. Manlio; and repaired later. The so-called tomb of Virgil (died B.C. 19), near it, is a chamber about 15 ft. square, with a vaulted roof, ten niches, and two windows. These ruins are shown in GIRAUD, and ROME, *Voy. Pitt.* The palazzo Cantalupo, on the river Posilippo, is by G. F. Mormando. The palazzo di Donna Anna, or della Regina Giovanna at Posilippo, 17th century, by C. Fansaga, was never completed (GIRAUD, pl. 19), and is now a glass factory.

The former palazzo di Poggio reale was built by G. da Majano for king Alfonso II (1494-5); it was surrounded with gardens extending to the sea, and has been destroyed, but the plan and elevation are preserved in SERLIO, *Architettura*, fol., Venice, 1663, p. 221-3; the four loggia of four columns each were not executed. At Portici, is the palazzo reale, restored, cir. 1810, by F. Mazois for king Murat; the plan by Layrix in LECLERE, pl. 56; it formerly (1803) held the Pompeian and other collections. A palazzo near Portici, called La Favorita, plan by Morey in LECLERE, pl. 19. The villa Riario and the villa Lavrea, with their gardens, are shown in plan by Crassel in LECLERE, pl. 105. At Caserta, sixteen miles distant, is the royal palace (Italian), begun 1752 by L. VANVITELLI, assisted by C. Murena.

Plan No. 193, by the Society for the Diffusion of Useful Knowledge. CELANO, *Notizie del bello, dell' antico, e del curioso della città di N.*, 4 vols., 8vo., 1792. ALFANO, *Descr. del regno di N.*, 4to., 1795. MORMILO, *Descr. di N.*, etc., 8vo., 1670. ACTON, *A New Journal of Italy* (Rome, Naples, and Savoy), 12mo., Lond., 1691. GUATTANI, *Antiq. de la Grande Grèce*, fol., Paris, 1805. CLERISSEAU, *Views in N.*, fol., 1765. ADAM, *Architectural Remains in Rome, N.*, etc., 8vo., drawings by Clerisseau. GIRAUD, *Le grand golfe de N., ou recueil des plus beaux palais*, 30 pl., fol., Nap., 1771. BARKER and BURFORD, *Descr. of view now exhibiting*, 8vo., Lond., 1821. ROSSINI, *Viaggio pittoresco*, etc., fol., Rome, 1839, pl. 49, 76-81. SAINT NON, *Voy. pitt. de N. et de Sicile*, fol., Paris, 1781-6, i; and remains at Misenum, ii, 218. SIGISMONDO, *Descr. di N.*, 8vo., N., 1788-9. SARNELLI, *Guida — par N.*, 12mo., N., 1713. GALANTI, *Napoli e Contorni*, 8vo., N., 1829. BLEAU, *Théâtre*, fol., La Hague, 1724, iii. ROMANELLI, *N. antica e moderna*, 3 vols., 12mo., N., 1815. *Souvenirs du golfe de N. recueillis en 1808, 1818, et 1824*, fifty

plates of views, palaces, and churches, fol., Paris, 1808. FABBRI, *Twenty Views of Naples*, etc., fol., 1777-82. MARSUSSELLI, *Biographia degli Uomini Illustri del regno di Nap.*, 10 vols., 4to., N., 1813-25. The PENNY MAGAZINE, 1832, i, 265, 285, gives a general view, and the grotto of Posilippo: iv, 369, describes the castles and the monastery of S. Martino; and v, 332, gives a cut of Virgil's tomb.

VASI, *Veduti d'Italia*, 4to., Rome, 1761. EUSTACE, *Classical Tour*. FORSYTH, *Remarks*, etc. WILLIAMS, *Travels*, ii. HUGHES, *Travels*, ii, 486. ROME, *Voyage Pittoresque*, etc., fol., Nap. 1823-4. VIANELLI ET GIGANTI, *Vues du Royaume de N.*, fol., 1843. VIRUSSEUX, *Italy and the Italians in the XIX cent.* COLLETTA, *Hist. of Naples, 1734-1825*, 8vo., Milan, 1861; transl. by HORNER, 8vo., Edinb., 1858. *Napoli e i luoghi celebri*, compiled by order of the Neapolitan ministry, 8vo., Nap., 1845, which has many good illustrations. LECLERE, *Recueil d'Architecture*, fol., Paris, 1826. *Description of Naples*, 8vo., Lond., 1853. *Illustrations*, s.v. Balustrade, pl. 96, from Spedale generale, and in one of the side chapels in the church of S. Francesco. 12. 14. 28. 50.

NAPOLI DI ROMANIA in Greece, see NAUPLIA.

NAPRON. An apron used by the mediæval masons; *l'imas* was another kind of apron used by them; STRUTES SOCIETY, *York Fabric Rolls*, 8vo., Durham, 1859, p. 25, 50, 90, 92, 348; quoting 1307, Pro linea tela ad naperones, WHITAKER, *Craven*, 291; and iiij naperons panni de lake, 2s. 6d., S. Leonard's Roll, 10 Ric. II.

NAQUET is considered as the architect of the church of S. Etienne at Beauvais; CAMBRY, *Dep. de l'Oise*.

NARBONA (HENRICUS DE). The chapter of the cathedral at Gerona in Spain decided in 1312 to rebuild it; the works were commenced under the administration (*obrerios*) of Raymond de Viloric and Arnould de Montredon. In 1316 the works were progressing, and in February 1320 the name of H. de Narbona appears in the registers. Dying soon after, he was succeeded by Jacobus de Favariis his countryman. (FAVARIIS, and GERONA). CURIA DEL VICARIATO DE GERONA, *Liber notularum, ab anno 1320 ad 1322*, fol. 48, as cited by VIOLETT-LE-DUC, *Dict. Raison*, i, 112. STREET, *Gothic Arch.*, 8vo., Lond., 1865, p. 319, however, notices that VILLANUEVA, *Viage Lit. à las Iglesias de Espana*, xii, 172, states that Jayme de Taverant, from Narbonne, was there in 1320, and others whom he names succeeded down to 1430.

NARBONNE (the Latin Colonia Decumanorum, and Narbo Martius). A town in the department of Aude in France, traversed by the Robine canal, over which are three bridges. It is one of the oldest towns of Gaul, and the first colonised by the Romans (B.C. 116) beyond the Alps. Francis I used up the ruins of the Roman works in the walls, which have been all removed since 1865; the four gates still remain; some bas-reliefs, friezes and inscriptions are represented in LABORDE, *Monumens de la France*, fol., Paris, 1836, i, pl. 63-4.

The ancient archbishopric is now united with that of Toulouse. The cathedral is dedicated to S. Just; the choir was erected between 3rd April 1272 and 1332; the remainder is still incomplete, and the nave is not erected. The edifice is unique in that part of France, being in a pure Northern style, and built with much skill, no settlements showing, although the interior is 40 metres or 131 ft. high. The plan is given in VIOLETT-LE-DUC, *Dict. s.v. Cathédrale*, p. 375-7, who supposes it to have been designed by the architect also employed at Clermont in Auvergne, and at Limoges, as they are alike in plan, system of construction, profiles, and details of ornament. The working outlines have been traced on the stone roofs over the aisles. LABORDE, ii, pl. 169, has a view. Some finely painted glass of the 16th cent., the high altar, the side chapels dating 15th cent., and the works to the western portion at end of 18th cent.; various monuments, especially one of white marble to the bishop de la Jugie, died 1376, de-

serve notice: also the mouldering tomb of Philippe III, le hardi, king of France. Behind the altar are some iron chairs in the form of the letter X, of considerable antiquity. Besides two other churches is that of S. Paul (Romanesque) outside the city, founded 1229.

The archbishop's palace is ancient; and is now used as the hôtel de ville, having been partly rebuilt in the style of the fifteenth century, by E. Viollet-le-Duc: attached to it are three ancient towers, one of which is a lofty square yellow tower. The museum of local antiquities is comprised in it as well as the picture gallery and a library of 10,000 volumes. In the vicinity of the city are marble quarries.

NODIER and TAYLOR, *Languedoc*, fol., Paris, 1833-37, ii, part 1, illustrate the gates of Perpignan and Beziers, interior of the cathedral and its cloister and porch, tomb of Lasborder, tower of the palace, and the door of the gensd'armes, interior of the ramparts, and the maison des Nourrices (Renaissance). Five plates are devoted to the abbey of Fontfroide, about six miles distant, of which the cloister is of the 13th century, restored in the 14th and 18th; all its buildings remain, and are inhabited by Cistercian monks; the church of the end of the 12th century is plain; plates are given of the fort, etc., at Sasses, church at Rieux, Merinville, etc. 14. 28. 50. 96.

NARDAU (HENRI), with Henri de Bruxelles, mason, agreed 1382 with the chapter of the cathedral at Troyes for five sous per day, or a mouton d'or per week, to execute the jubé in the cathedral at Troyes, which was destroyed in 1793. The first stone was laid 22nd April 1383 and completed 1400. The records prove the use of "ung pourtrait fait en parchemin", for it was done by H. de Bruxelles, as well as another by Michelin the mason, in competition: PUGN, *Chancel Screens*, 4to., Lond., 1851, p. 55-6.

NARDO (the ancient NERETUM). A town in the province of Otranto, in southern Italy. It is well-built and paved; and is the see of a bishopric in conjunction with Gallipoli. The ancient cathedral, formerly a Benedictine church, has a fine baptistry. There are eight other churches; a small circular chapel near the town gate is of interest. There is an episcopal palace, with a library. 28. 50. 96.

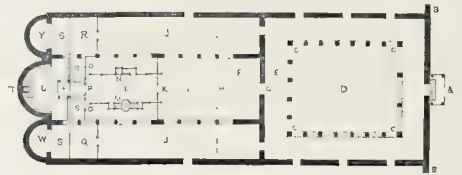
NARES. A term used by VITRUVIUS, viii, 7, to signify the point of issue of a conduit or aqueduct. It is the Latin for the nostrils.

NARNI (the ancient NEQUINUM, a strong town of the Umbri; and NARNIA). A town near Spoleto in Italy, situated on a lofty hill near the river Nera. The castle is now used as a prison. The casa de' Progetti is by Paolo Posi, *cir.* 1750. The cathedral is dedicated to S. Giovenale martire. It is Basilican, having nine almost flat segmental arches next the aisles; the nave is vaulted in three bays; the choir is later Romanesque, having a five-sided apse over a modernised crypt; the stalls have Pointed canopies: the tower is square and massy. There are four parish churches, three monasteries, and seven convents, of which the church of S. Agostino has a modernised nave and aisles, but an ancient vaulted Romanesque chancel; and an external mosaic. The tower is tall and thin, square in plan, with large belfry windows, but no division into stages. The palazzo vescovile is a noble structure. WEBB, *Ecclesiology*, 8vo., Lond., 1848, p. 468-9. A ruined bridge in the vicinity, over the river Nera, bears the name of the emperor Augustus (b.c. 31—A.D. 15). Only one of four semicircular stone arches remains, which is 142 ft. span, and 102 ft. high to the soffit; the piers are nearly 30 ft. wide; the other arches were 135, 114, and 75 ft. span; MARTINELLI, *Descr. di diversi ponti*, 4to., Roma, 1676. Two views of the bridge were published by Hackert in 1779. In LECLERE, *Recueil d'Arch.*, fol., Paris, 1826, are given, pl. 62, a plan, etc., of an inn on the road from Terni; pl. 69, a prettily arranged plan of two residences with a court between them; and pl. 76, a plan of one of the churches, having a nine-arched nave with aisles with an outer ambulatory, and a very large eastern hemicycle. CALINDRI, *Saggio Statistico del Pontificio Stato*, 4to.,

Perugia, 1829. *Illustrations*, Chimney, 1848-49, from the cathedral, and in the via Nuova. 3. 12. 14. 25. 50. 96.

NARROW GROUNDS. See GROUNDS.

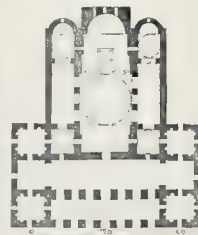
NARTHEX. The name applied to a porch or portico in front of a basilica; to the ambulatories of a cloister; to the enclosed court at the west end of an early Christian church; also to a vestibule or covered space immediately within the building. It was so called from its narrow oblong shape, resembling a rod or ferule. This term does not appear as one of the threefold divisions of a church till the beginning of the sixth century, according to MORINUS, *Com. Hist.*, fol., Paris, 1651, vi, 1. BINGHAM, *Origines Eccles.*, 8vo., Lond., 1840, B. 8, chap. 3 and 4, ii, 394-406, enlarges considerably on



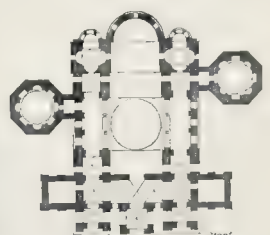
Outline of a Basilican church.

this subject, referring to EUSEBIUS, for the exterior (EXONARTHEX), and the interior (ESONARTHEX) narthex; the *exonarthex*, *E*, looked into the atrium, and was in fact one of its porticos or cloisters around the enclosure, which formed a continuous *porticus*, sometimes with a porch under it, as at SS. Nereo ed Achilleo, at Rome. It was a lean-to until the fifth century; the interior narthex, *E*, being marked only by barriers, or else a marked feature of the building. Some writers confine its application to the latter or exonarthex only. SUICER, *Thes. Eccles.*, s.v., and DUFRESNE, *Com. in Paul. Silent.*, give the name narthex to either lobby: BASILICA, p. 36. The vague and conflicting manner in which such terms as *narthex* and *porticus* were frequently used, renders it almost impossible to define accurately their particular meaning.

The porch contained three doors, the centre one for the clergy, the north for the women, and the south for the men. The narthex is used in S. Front at Périgueux, at Romain Mortier, of the tenth century; at Jumièges and Neuchâtel; and a narrow one perhaps at Fountains and at Beaulieu abbeys. At Moissac and Petersburg, and Halle 1124, it supports a parvise in the west tower. A splendid example existed in the abbey at Cluny, of the end of the thirteenth century, where, as well as at La Charité, and at Vézeley, the narthex was a church with its aisles, triforium, and two towers; VIOLETT-LE-DUC, *Dict. Rais.*, i, 259-61. The ancient disposition of the west front at S. Alban's abbey church, answers to the *narthex* or penitent's porch of the primitive Basilican churches; BUCKLER, *S. Albans*, 8vo., Lond., 1847, p. 90. A sort of galilee or narthex on the south-west side of Munster cathedral is of Romanesque date; *Illustrations*, Porch, part i, 1863-5. The



Myra.



Casaba (Arina) 7th or 8th century.

woodcuts exhibit good examples of the narthex. The Cistercian abbey church, consecrated 1278, at Riddagshausen near Brunswick, is a basilica with a cloistered atrium; KALLENBACH dates it 1215-20.

In the large basilicas there was a narthex at each end of the atrium or forecourt. The exterior, called the vestibule, *horopulatio*, *propylæos*, or first entrance, was a large porch or colonnade of three, five, or seven pillars, sometimes double, with an upper and lower range, as at Tournus; in it the dead were buried, after the Council of Nantes permitted intermural interment in 653. In smaller churches an outer narthex was added for the use of the penitents called weepers: as the narthex inside the building was the place of the second class of penitents, the hearers. It is a portico of insulated columns at several Roman churches of ancient date, perhaps reappearing in the Palladian porticos; still earlier, the portal cloister was added round the courts of several Roman churches, at Ravenna, Novara, Milan, Parenzo, Iaach, Lorsch, and Tournus; the churches at Cologne, Trebitsch, and Gürk, and in the latter instances with a gallery above it; WALCOTT, *Sacred Archaeology*, 8vo., Lond., 1868. The narthex of the Romanesque period to the church of S. Bartholomew; a lofty three-staged oblong narthex to that of S. James, both at Liege; to S. Gereon at Cologne; and that to Sta. Agata at Ravenna, opening by a large arch into the nave, are noticed by WEBB, *Continental Ecclesiology*, 8vo., Lond., 1848. ANNALES DE PHILOSOPHIE CHRÉTIENNE, xvii, 422-6; xix, 346. SCHAYES, *L'Architecture*, 1850, i, 66; RAMÉE, *Hist.*, 1843, ii, 390-4. ANI. BENEDICTINE. GREEK CHURCH. LOCUS AUSCULTANTUM.

NASH (JOHN), was born 1752, probably at Cardigan in South Wales; Mr. B. FERREY, *Recollections of Pugin*, etc., states he was born in London, and that his parents being possessed of some fortune, were able to place their son with Sir R. Taylor, cotemporarily with S. P. Cockerell, Craig, Leach, and others. (BRITTON, *Autobiography*, states, without sufficient foundation, that Nash practised at first as a miniature painter, nor is it correct that he set up in London as a measurer and speculative builder.) He then retired to a property at Caermarthen, and lived for some years quite independent. A visit of Mr. S. P. Cockerell's to Caermarthen, having attracted him, he then turned his attention again to architecture. The following are among his principal works, in the order of their dates, with the authorities, and the publications in which they are illustrated.

1793, the County gaol at Cardigan (PENNY CYC.; JONES, *Views in South Wales*). 1797, the County gaol at Hereford (Greek Doric). 1797, took out a patent for some improvements in cast iron arches, the ribs being formed of plates, (BUILDER *Journal*, xiv, 454). 1797, Southgate Grove, Middlesex (given in RICHARDSON, *New Vit. Brit.*, fol., Lond., 1802, i, pl. 31). 1797-9, alterations at Corsham house, Wiltshire, for Paul C. Methuen, esq. (the north front is Tudor-Gothic, cost £80,000; the grounds were laid out by H. Repton, who claimed 1803 the design for himself and his son, then in Nash's office (LOUDON'S REPTON'S works, 8vo., 1840, p. 289; BRITTON, *Beauties of Wiltshire*; BRITTON, *Toddington*, xiii; NEALE, ii, ser. 2). 1797-8, the Casino, Dulwich, Surrey, for R. Shaw, esq., "a new style of country house" (HASSELL, *Views*; DALLAWAY, *Anecdotes*, 1800, p. 159). 1798, made a design for a conservatory for the prince of Wales (R. A. Catalogue). Cir. 1800, the west front of, and the chapter house at, S. David's cathedral. 1799, Sundridge park, Kent, for Claude Scott, esq. (Italian), some works after Repton and Wyatt (NEALE, v, ser. 2). 1800-4, Luscombe in Devonshire (castellated) for Charles Hoare, esq. (NEALE, i; and ACKERMAN, 1828, xii, 251). 1800, proposed restorations at Helmingham hall, Suffolk, for lord Dysart. 1800, a house at Dawlish, in Devonshire. 1801, a design for a new quadrangle at Magdalen college, Oxford, not executed. 1801, alterations at Bulstrode. 1802, design for a house at Shrewsbury, one near the river Conway, and a third in Scotland. 1803, Killymore castle, co. Tyrone, for lieutenant-col. Stewart, cost £80,000. 1805, house at Sunbridge, for lady Ashburton. 1806, the south front of Hale Hall, Lancashire, for John Blackburn, esq., M.P., to corres-

ARCH. PUB. SOC

pond with the north front, erected 1674 (NEALE, i, ser. 2). 1808, Ravensworth castle, Durham (Gothic), for lord Ravensworth. 1812, Highgate archway, commenced 1811 as a tunnel 24 ft. wide, which fell in early in the year (a large view was engraved, drawn by A. Pugin, 1813; ACKERMANN, viii, 156; xiv, 289, 362; SIMMS, *Tunneling*, 2nd edit., 8vo., Lond., 1859, p. 172). 1813, completed Childwall hall, Lancashire (castellated), for B. Gascoyne, esq., now the seat of marquis of Salisbury (NEALE, ii, ser. 2; and TWYCCROSS, *Mansions*, 4to., Lond., 1847, iii, 22).

The elaborate preparations in the three parks for the grand jubilee, 1 August 1814, in commemoration of the general peace, consisted, besides a miniature display of naval warlike operations on the Serpentine river, of a bridge and Chinese pagoda at S. James's park, and of the Temple of Concord suggested by Sir William Congreve and designed by Mr. Nash at the Green park (these are described and illustrated in ACKERMANN, *Repository of Arts*, 8vo., London, 1814, xii, 225, 286; and in PAPWORTH, *Select Views*, 8vo., Lond., 1816; and by views published by Messrs. Latilla and Greenwood, who therein unjustly arrogate the merit of the design). The bridge, although intended to last for one night only, was subsequently rendered secure by Mr. J. W. Hiort and left as a permanent structure for passengers during several years. Nash acted temporarily as Surveyor-General by command of the prince Regent during the vacancy caused by the sudden death of James Wyatt. The building designed by Nash, and erected in the garden at Carlton House in 1814, as a reception-room for visitors upon the occasion of the visit of the allied sovereigns, by the prince Regent, had twenty-four sides, being 120 ft. in diameter, with a remarkable roof; it was afterwards presented to the garrison at Woolwich, and now serves as a depository for models of a naval and military description. (J. W. HIORT).

1816-18, with G. Repton, altered and enlarged the king's theatre or opera house in the Haymarket, also added the arcade, and the colonnade formed of cast iron columns (BRITTON and PUGIN, i, 72). 1817, Gracefield lodge, Queen's co. (cottage ornée), for Mrs. Kavanagh (NEALE, *Seats*, vi), erected by — Robertson of Kilkenny. Loughcooter, co. Galway, for C. Vereker. From 1817 to 7th March 1827 (which was his last visit), he was engaged for the prince Regent, upon the alterations and remodelling of the Pavilion at Brighton, which had been built 1784-7 by H. Holland; added to by his pupil P. F. Robinson; 1803-5, stables, etc., built by W. Porden; and 1805, proposed additions by H. Repton (BRAYLEY, *The Pavilion*, 31 pl., fol., London, 1838); he was succeeded 1822 by J. H. Good. 1818, he built an institution in Albany Street, as his own speculation, to be leased to the Ophthalmic Institution (ACKERMANN, 1819, vii, 361). A bridge in Somersetshire, which fell. 1820-1, the Haymarket theatre (BRITTON and PUGIN, i, 262). 1823-4, with James Elmes, the gallery of the society of British Artists, Suffolk Street, Pall Mall (the roof was altered 1857). 1824, the entrance to the Queen's Mews, Piccadilly, cost £63,181. Before 1826, Rockingham near Boyle, co. Roscommon, for lord Lorton. 1826-7, the church of S. Mary's Haggerstone. 1826-7, the memorial column of black marble at Caermarthen to sir Thomas Picton. Before 1827, Kentchurch park, Herefordshire (castellated), for John Lucy Scudamore, esq.; the porch was by Mr. Tudor of Monmouth, his receiver (NEALE, iv, ser. 2); and before 1828, Garnistone, Herefordshire (castellated), for Samuel Peploe, esq. (NEALE, *idem*).

Amongst his other and undated works, are: Stranbally, in Ireland, for the earl of Lismore; Mr. Welford's house, near Shrewsbury; Ingestre, the seat of lord Talbot, restorations; Mr. Staples's, in Ireland; Mr. Richardson's, at Somerset in Ireland; Mr. Agnew's, in Ireland; villa for the duke of Richmond; General St. John's Bank farm; a Druid's temple at Blaize castle, for Mr. Harfords; various designs ex-

executed for Mr. C. Townley and for Mr. Johnes of Hafod. *Market places* at Abergavenny and Stafford. *Guildhall* at Newport, Isle of Wight. *Bridges* at Stamford court; at Sharnaloe, for Mr. Drake; for lord Robert Spencer; for Mr. Johnes at Hafod; at Albury; and for Miss Jennings' villa in Windsor Great Park. *Gates*, for Mr. Dodson at Shrewsbury; and at Hampton Court, Radnorshire. *Mausoleum* for lord Selkirk; and six different designs to commemorate the battle of Waterloo, no one of which was ever carried out.

In July 1793 the lords of the Treasury empowered Mr. Fordyce, surveyor-general, to offer a premium of £1000 for the best plan for building on the Marylebone estate; they afterwards selected one by Nash, then architect and surveyor to the Woods and Forests, and one of the architects attached to the Board of Works, which displayed detached villas, and another by Messrs. Leverton and Chawner, architects and surveyors of buildings of Land Revenue, of a more urban character. The crown, having obtained an Act of Parliament, and appointed a commission to form a park, etc., in the lands in Marylebone on the plans formed by Nash, and now known as Regent's park, they were carried out from 1812. Nash designed all the terraces except Cornwall Terrace (Munster Terrace was not built until after 1827); also Park Crescent and Square, Albany and adjoining streets, the Park Villages, and the outer road of the park, which were all comprised in the scheme. (*First Report of Commissioners*, etc., 1812; BRITTON and PUGIN, ii, 224). 1812-20, he projected the Regent's canal, for the purpose of forming a continuous line of navigation from the Grand Junction canal at Paddington to the river Thames at Limehouse, with basins at Regent's park, City Road, S. Luke's, and Limehouse. It was commenced 14th October 1812, and opened throughout 1st August 1820, it is rather more than $8\frac{1}{2}$ miles long; James Morgan was the engineer. 1813-16, Regent Street was designed and carried out by him under an Act of Parliament, July 1813, 53rd Geo. III, c. 120: it was intended as a communication from Carlton house to the park, in which the prince Regent had intended building a residence. Foley house and grounds, which then terminated Portland Place on the south, were bought by Nash for £70,000 as part of the plan, and after selling the ground for the street, he built Langham Place and the house for sir J. Langham on the remainder, and 1822-24, All Souls' church as a termination to the view up Regent Street (BRITTON and PUGIN, ii, 99). The *Fifth Report* of the Commissioners, dated 6th May 1826, stated the expenditure in forming Regent Street to have been £1,472,719 : 6 : 3, with £60,863 : 10 : 7 for the sewer = £1,533,582 : 16 : 10. 1816, Argyll rooms, at the north corner of Argyll Street, for Joseph Welch; the large room was the best in London for sound, and was used for concerts of note, until burnt down in 1834, when Nos. 246 to 254 Regent Street were built. 1819, the front of the County fire office, the remainder by R. Abraham: the Quadrant, on ground leased to himself; the bold projecting colonnade, supported by 145 cast iron Doric columns, was removed 1848. 1823, the residence for his relative, Mr. G. Edwards, on the northern part of a site, where, on the southern portion, he designed a residence for himself, to which he removed from No. 29, Dover Street, and lived there until he retired from the profession; here was a noble gallery decorated with copies of Raphael's paintings in the Vatican; to make which, with permission of the pope, he had artists employed for four years at Rome (BRITTON and PUGIN, ii, 287). A house opposite for Charles Blicke, esq., rebuilt 1838-9 as the Club Chambers. Several of the façades of the terraces of shops in Regent Street, combining several dwellings into a single façade, followed out by some of the architects employed for the remainder of them. 1826-8, United Service Club house, Pall Mall; and perhaps Waterloo Place at this time. 1825-7, Buckingham palace for king George IV, on the site of Buckingham house, the grant for which

by Parliament was only for repairing and enlarging it (BRITTON and PUGIN, Supp. by LEEDS, 103: great additions were made for queen Victoria, and subsequently). The arch, 1825-7 in front of the palace, of Carrara marble, at a cost of £30,000; which was removed 1850-1 to Cumberland gate, Oxford Street. Alterations at Windsor castle for George IV, together with a cottage ornée, near Sandpit gate, in the Great park, on site of Frost lodge, the residence of T. Sandby (2 plates in ACKERMANN, 1823, i, 1). 1828, east wing of Carlton House Terrace, with J. Pennethorne; and the laying out of S. James's Park, converting it from a swampy meadow into the garden as now seen.

Another of his early designs was his own residence East Cowes castle, Isle of Wight (erected before 1826, ACKERMANN, vii, 249), to which he retired about 1831, and there died, 13th May 1835, in his 83rd year. He is said to have left very little property, notwithstanding the vast sums of money he had derived from his profession. His books, prints, and drawings were sold at Evans's, in Pall Mall, on 15th July 1835, and four following days. In Jesus college, Oxford, is a portrait of him by Sir T. Lawrence, considered one of his best paintings; and a bust is in the collection of the Royal Institute of Brit. Archts. John Adey Repton was a pupil, and James Pennethorne, a relative, carried through Nash's works as he became advanced in years. Aug. Pugin, John Foulon, and J. Morgan of the Regent's canal, were his first clerks.

No memoir exists of this great improver of the west end of London; but besides the designs described above, the following references afford criticism on his style and influence: BUILDER *Journal*, 1855, xiii, 585; xiv, 442. CIVIL ENGINEER etc. *Journal*, 1847, x, 380-1. BRITTON, *Toddington*, 4to., Lond., 1840, xiii, 18, 21, 26. CUNNINGHAM, *Handbook of London*, 8vo., 1850. BRITTON and PUGIN, *Public Edifices of London*, 8vo., Lond., 1825-8, and Supp. by LEEDS, 1838. ACKERMANN, *Repository of Arts*, etc., for 1822, gives several views of parts of the new streets, etc. NEALE, *Seats of the Nobility*, etc., 4to., Lond., vols. as noted in text. GENTLEMAN'S MAGAZINE, new series, iv, 437. ELMES and SHEPHERD, *London in the Nineteenth Century*, 4to., Lond., 1827-32, with views. WHITE, *Some Account of the Proposed Improvements*, 8vo., Lond., 1814.

14.

Nash was a man of large conceptions and daring enterprise. He understood the laying out of towns and ornamental gardening. It was due to his spirit of improvement and his influence with king George IV, when prince regent, that the line of Regent Street was cut through a dense mass of inferior houses, and that part of London made to assume a nobler aspect. He was, as an architect, deficient in the professional elementary education: but he had general artistic feeling in the arrangement of masses, and under his energetic impetus London made its first start for the metropolitan improvements, which have since his time been carried out.

T. L. D.

NASIR ABU OTHMAN, the vizier of king Abderahman or Abd-el-Rahman III, to whom was confided 917 the superintendence of the numerous mosques at Cordova, Seville, and other towns in Spain, with marble fountains in the two named; the reparation of the great bridge over the Guadalquivir; and the works at the royal palaces; CONDÉ, *Dominion of the Arabs*, etc., Lond., 1854, i, 379. BATISSIER, *Art Mont.*, 8vo., Paris, 1845, p. 420, mentions a fine *djami* at Grenada, erected under the same vizier.

NASK. The Hindostanee name for a quoin or coin stone. KITTON, *Indian Arch.*, fol., Calcutta, 1838.

NASMITH (ROBERT), designed 1789-90 Stoke Pogis park, co. Bucks., for John Penn, esq.; it was of brick stuccoed; and was entirely altered by James Wyatt. NEALE, *Seats*, 4to., Lond., 1818, i. ACKERMANN, *Repository of Arts*, 1824, iii, 313. He died 30th August 1793.

NASMYTH'S GIRDER, see BOW AND STRING GIRDER.

NATALI (GIOVANNI BATTISTA), also an artist in intar-

siatura, designed 1653 the church of S. Bartolomeo di Porta Ravennata at Bologna, on site of former church built 1530 by A. da Formigine, whose portico was preserved. GRASSELLI, *Abecedario*, 1827, and ZAIST, *Nolizie*, 1774, note other artists of this name, as Carlo, Gio. Bat. Guiseppe, Francesco, Pietro, and Lorenzo, practising at Cremona between 1590 and 1723; among whom is CARLO NATALI, called Il Guardolini, born 1590, who died 1683, and by whom is a drawing 1674 of the campanile at Cremona, in the King's library, in the British Museum. 105.

NATALI, magister casarius, founded 805 at Lucca, a church dedicated to the Virgin, according to a document in the archives; BERTINI, *Storia di Lucca*, ii, doc. iv; quoted in CORDERO, *Ital. Archit.*, etc., 8vo., Brescia, 1829, p. 40.

NATATIO and NATATORIUM. The cold bath of the Roman thermæ; also called piscina, baptisterium, puteus, λουτρον.

NATTES. A very common word for mats or matting; SURTEES SOCIETY, *York Fabric Rolls*, 8vo., Durham, 1859, p. 348. It has been applied to the surface decoration in stonework used in the twelfth century, as at Bayeux cathedral, and so called from its semblance to matting.

NATURAL BED OF A STONE. The term *bed* is given to stone in a quarry generally about six feet or more in thickness; a *layer* is less, and a *stratum* still less. It has been argued, that in all masonry it is important for its duration that the laminæ should be placed perpendicular to the face of the work and parallel to the horizon, inasmuch as the connecting substance of these laminæ is more friable than the laminæ themselves, and therefore apt to scale off in large flakes, and thus induce a rapid decay of the work. A discussion on this subject will be found in *BUILDER Journal*, 1860, xviii, 189, etc., 237, 286; and xix, 325. The natural bed of a stone is also the surface of a stone from which the laminæ were separated, as in self-faced Yorkshire flag stones. BEN.

NATURAL HISTORY MUSEUM. A building erected to contain classified collections of natural objects, arranged and exhibited for the convenient examination and study of the scientific inquirer, as well as to excite the interest of the un-instructed visitor. These collections are to be divided under the general heads of zoology, which, to a certain extent, may embrace ethnology, botany, geology (including palæontology), and mineralogy. Each of these divisions of the great world of nature requires special arrangements for its proper exhibition; and therefore the portions of the building to be assigned to them respectively ought to be known beforehand to the architect. In some instances it may be desirable to set aside an apartment for the illustration of the natural history of a particular district (e.g., our own national museum might not only have a gallery exclusively for British natural history, but others to illustrate the *flora* and *fauna* of each of our great dependencies, as the Canadas, Australia, and India). It might add to the interest and usefulness of the museum if another gallery, say the central or entrance hall, were devoted to typical specimens, making it an epitome or index of what the other galleries of the museum contain.

The main object of the architect's solicitude will be the mode of lighting his galleries. It is essential of course that the visitor, while examining an object, should not himself intercept the light, and as almost every specimen should be exhibited under glass, the designer, keeping in view the equality of the angles of incidence and reflection, will take care to avoid the images of windows and skylights appearing where specimens of natural history are sought for. He will also avoid the refraction caused by the rays of light striking the intercepting glass at too acute an angle. Where it is necessary to introduce top-light, it will in the majority of cases be found expedient to do so in a cant or cove, formed at the junction of wall and ceiling. Small specimens, e.g., mineralogical and some zoological, are best shown in table-cases; but they should not be placed, for the foregoing reasons, immediately below a

ceiling-light. Strong side lights will no doubt be found best adapted for the general exhibition of specimens, which, instead of being placed against the wall spaces between the windows, should, if in vertical cases, be brought out into the room at right angles to such wall-spaces. So arranged, the cases would probably in practice be placed in pairs, back to back. It should be remembered that an ichthyological collection, being kept in spirit, requires housing apart in a building of fire-proof construction.

The mode of exhibiting and referring to specimens has been of late a subject of warm debate. Some authorities of eminence recommend a series of top-lighted galleries, the cases having air-tight glazed fronts, the specimens being accessible only from intermediate private galleries, intended solely for students and curators. In these private galleries might be stored, in drawers or otherwise, duplicate specimens, or specimens slightly varying from those exhibited. They further recommend that the private galleries should be connected with each other, and with workshops and professors' rooms, where specimens are prepared, set up, or specially studied; the public galleries being connected together by separate halls and corridors, so that the public may never cross or interfere with the domain of the student. One advantage of this plan would be comparative freedom from dust, so destructive an agent in most museums; against it is urged the impossibility of satisfactorily arranging specimens when the manipulator cannot see them from the same side as the visitor. A. W.

NAUCLERIO (GIOVANNI BATTISTA), of Naples, completed the Dominican church of S. Giovan Battista, begun by F. Picchiatti; and its atrium and exterior façade; erected the high altar of the church of S. Domenico dei Predicatori, designed by C. Fansaga; and 1709 some other works in the same building; designed the church of S. Demetrio; 1718 restored and modernised that of S. Maria della Concordia; designed the church S. Maria delle Grazie of the monastery il ritiro di Mondragone founded 1653; and 1721, that of the monastery of S. Francesco degli Scaroni; all at Naples. 95.

NAUCLERIO (Muzio), did an altar in the chapel of S. Tommaso Aquino in the cloisters of the monastery of S. Domenico dei Predicatori; a chapel in the monastery of S. Pietro ad Aram; also 1679 completed the fourth cloister in the monastery of Monte Oliveto, now S. Carlo Borromeo, begun by G. G. Conforto, and executed a statue in its monastery; all at Naples. 95.

NAUCRATIS, in Egypt, see THE HELLENIUM.

NAUMACHIA (Gr. *navs*, ship, and *μαχη*, battle). A building or place made especially for the show of mock sea fights, sufficient water being introduced to float the ships. Julius Cæsar, B.C. 46, was the first to give a representation of a sea fight at Rome on an extensive scale. The dimensions and construction of a vessel of the time of the emperor Claudius (41-54), were accurately ascertained by pope Pius II, about 1461, in consequence of one being found in a lake. Nero appears to have preferred the amphitheatre for these exhibitions; having a battle of infantry afterwards. Domitian made a new one, and was probably the first to erect a building of stone around an artificial lake dug near the Tiber; previously the spectators sat on wooden benches, rising above one another, on the earth dug out from the excavation. In later times the naumachie were usually surrounded with buildings like a circus. Hadrian had a naumachia attached to his palace, A.D. 117, in the neighbourhood of Ponte Lucano.

The amphitheatres, originally specially built for the exhibition of gladiatorial contests, were occasionally made adaptable for naval fights, as in the case of the Coliseum at Rome, the arrangements for which were lately (1875) discovered by J. H. Parker, and are represented in photographs; as well as those at Pergamus and Cyzicus, which are interesting as being situated on brooks which run through the buildings in the direction of the major axis, so that the arena could be inundated

very quickly when required for naval combats. The naumachia formed by the river Adige at Verona, with the theatre on its banks, and the ambulatorium beyond, formed of covered terraces one above the other, are illustrated from drawings by Palladio, and the ruins described by E. FALKENER, in *Museum of Classical Antiquities*, 8vo., Lond., 1852, ii, 174-200; who gives references to classic writers on the subject of this article. The amphitheatre or naumachia at Merida in Spain is in good preservation. There are remains of others at Metz, and Saintes, in France. LARIX. 14. 78.

A theatre or naumachia, in the Wady Sabra at Petra, is formed by advantage having been taken of a ravine through which the mountain torrents passed; a reservoir was formed, and the overflow conducted by a pipe into the arena of the theatre, which was hewn perpendicularly for eight feet, and coated with cement, still well preserved. Being of small extent, the heat of the sun would cause the water to evaporate in summer, and thus the edifice could be used for a theatre at one time, and for a naval fight at another. LABORDE, *Arabia Petra*, transl., 8vo., London, 1836, p. 196.

As modern examples it may be cited, that at the wedding of Ferdinand I (1469-94), the cortile of the palazzo Pitti at Florence served as a naumachia; and the circo or anfiteatro Diurno at Milan, designed 1805-27, by L. Canonica, had the arena filled with water by order of Napoleon I, for ship fights.

NAUMANN (.....), *obermaurermeister* at Berlin, *cir.* 1737-40, see T. FAVRE.

NAUMBURG. A town in the province of Saxony in Prussia, situated on the river Saale; the town proper is walled, and there are three suburbs. The cathedral dedicated to the Virgin Mary and SS. Peter and Paul, founded 1028, is mostly Romanesque; the nave dates 1209-42; it has also transepts, eastern and western choirs, and lofty towers. The cathedral, chapterhouse, and cloisters are given in five plates in KING, *Study Book*, 4to., Lond., 1858-68; and the edifice in PUTTRICH, *Denkmale*, fol., Leipzig, 1836-52. KALLENBACH, *Chronologie*, fol., Mun., 1847, gives the west choir as 1235-45; it has a *lettner* of same date; the east choir is of the Decorated period, and has a Romanesque *lettner*, which is a rare example. Its ancient monuments, altars, statues of 13th century, carved work and paintings, and the crypt with remarkable sculpture of the time, and a *lettner*, deserve attention. The restoration of the building was in progress in 1874-5. The church of S. Wenzel or the Stadtkirche (in PUTTRICH, pl. 26-8), with its organ and paintings; and that of S. Maurice, with the monument of bishop Richwins, are likewise interesting, out of the four other churches; PUTTRICH also gives the *Curie S. Ægydii* or houses of the canons. There are a townhouse, gymnasium, and a court of justice. The *hohe saalbau* of the castle is given under 1235-45 in KALLENBACH. MÜLLER, *Handbook*; LEPSIUS, 1822, and KRATZSCH, 1827, are local guide books. 14. 28. 50. 96.

NAUPLIA, generally called NAPOLI DI ROMANIA, and sometimes ANAPLI. A sea-port town in the Morea, occupying the site of the ancient Nauplia, one of the most ancient cities of Greece, and once the port and arsenal of Argos. It is enclosed by Venetian fortifications, dating from the thirteenth century to 1537, and has two fortresses; one called Palamidhi, situated on a lofty and precipitous rock, is one of the strongest in Europe. The ramparts towards the east are partly composed of the ancient walls, of the same construction and probably age as those of the acropolis of Argos. After the Greek insurrection it was the head town in Greece, until superseded 1834 by Athens. The new houses built in the European style are, generally speaking, ill constructed and arranged; in each, the lower story is used for stabling, and a spacious staircase leads to the upper apartments. It is supplied with good water by an aqueduct. There is a Greek and a Latin church. BLOCET, *Morée*, fol., Paris, 1833, ii, pl.

74-5, gives a plan and view. LEAKE, *Morea*, ii, 356; and *Peloponnesiaca*, 252. MURE, *Tour*, ii, 187. CURTIUS, *Peloponnesos*, ii, 389, and the works of SPON, CORONELLI, and GELL. 14. 23. 50.

NAUTA (GERBEN), a Frisian architect, is mentioned by NAPJUS, *Chronicles of Sneek*, as having designed the town hall there, erected 1730-45. 24.

NAVAL ARCHITECTURE. The art of designing and building ships and vessels for the purpose of navigation. STEINITZ, *The Ship*, etc., 4to., Lond., 1849; LINDSAY, *Hist. of Merchant Shipping*, etc., 4 vols., 8vo., Lond., 1874-6.

NAVARRO (MIGUEL), built 1421 the cloisters of the convent of San Francisco el grande at Valencia, as recorded in the acts of Antonio Pascual, a notary of that city, which state that Francisco Librà, custodian of the convent, paid to Navarro 100 florins for each arcade. 66.

NAVE (Lat. *navis*; Gr. *vaos*; Ital. *nave*; Span. *cara*; Fr. *nef*; Ger. *schiff*). The body, or chief part, of a large church, extending from the principal entrance to the transept, or to the choir or chancel, if there are no transepts. It has generally an aisle on each side, hence the nave has been called the *middle aisle*; and it was generally called the *body* of the church by old English writers. For the nave of the ancient churches, see BASILICA. The church of SS. Vincent and Anastasius at Rome has its walls curved like the ribs of a ship; and the nave of Payerne is of uneven width, said to represent a vessel beaten by the waves.

Where aisles are introduced and separated from the nave by piers or columns and arches, there is, in large churches, a *triforium* or gallery, and over that again the clere- or clear-story windows. At some places, as in Bath abbey church, there is no triforium; and at Bristol cathedral the choir has neither triforium nor clear-story. In several churches in Normandy, the main piers and arches are surmounted by others of the same dimensions, to the summit of which the aisles are carried up. GWILT, *Encyc.*, edit., 1876, in Glossary, s.v. Nave, gives outlines of bays, showing their progression from the Romanesque period.

The ordinary accessories of a nave were a few altars, sometimes tombs, which were placed between the columns so as to leave a free passage for processions; the stations for the clergy were often marked in the pavement by stones: the font was usually placed near the west entrance. Confessionals were sometimes fixed against the walls. A screen supporting the rood loft separated the nave from the choir.

The nave has been put to other uses; in that of S. Paul's cathedral in 1385, persons bought, sold, and played ball, and two centuries later it was put to abominable desecration. At Durham and Worcester there was a common thoroughfare; and in York the country gentry and townsfolk made it a fashionable walk. WILCOTT, *Sacred Archaeology*, 1868.

"The naves of the churches of Perigord and Angoumois are without lateral aisles, and are roofed with a series of domes, raised over longitudinal and transverse arches; those of Anjou, also without aisles, have square compartments of cross vaulting, much raised at the apex." An example between these two systems is seen in the church at Loches in Touraine, which, when seen at the side, shows two steeples, and two large octagonal pyramids between them, which latter are placed over the nave, the same shell of stone forming both the exterior and interior roof. This church is believed to have been built nearly entirely in 1180; it is fully illustrated by PETIT, *Arch. Studies*, 8vo., Lond., 1854; reviewed in *Builder Journal*, xii, 469-71. At the end of the twelfth century in France, the naves did not exceed from 33 ft. to 36 ft. from centre to centre of the pillars; but in the later periods they attained to about 50 ft. and 53 ft. In churches of only one nave, as the cathedral at Toulouse and at Alby, twelfth and fourteenth centuries, the width between the walls was 63 ft. and upwards; at Perpignan 60 ft.; other such structures are

at Souillac, and S. Front de Périgueux. S. Yved de Braines is 33 ft. between centres of piers. Nôtre Dame at Etampes, 33 ft.; S. Martin at Etampes, 34 ft.; Vilvorde, 40 ft., the height being about double; Soissons cathedral, 43 ft., height about treble; S. Etienne at Auxerre, 44 ft.; S. Bertrand de Comminges, 50 ft., without aisles; Toulouse, the Cordeliers, 58 ft.

In *England*, a large proportion of old churches will be found to be under 30 ft. between the centres of the piers; the modern ones about 25 ft. Lichfield is about 33 ft.; Hereford, 38 ft.; Chichester, 37 ft.; York, 48 ft.; Westminster, 88 ft. 6 in.; Ely, 30 ft.; Old S. Pauls, 39 ft. The churches at Croxden and Grey, in England, have no aisles. The Dutch church in Austin Friars, London, "a noble model of a preaching nave, being of great size and unusual openness", G. G. Scott.

In *Germany*: Fribourg cathedral is 36 ft.; S. Croix, at Breslau, 40 ft.; Lubeck cathedral, 40 ft.; Worms cathedral, 44 ft. the height being nearly treble; S. Castor, Coblenz, 39 ft.; S. Mary's, Lubeck, 48 ft., height over treble; Ulm cathedral, 56 ft., over treble in height; Spire cathedral, 51 ft., over double in height; Treves cathedral, 60 ft.

In *Spain*: Palma, church of Dominicans, is 95 ft. clear span between walls; Gerona cathedral, 73 ft. ditto; church at Ciudad real, "is so grand, spacious, and lofty, that no other church in Spain equals it, except the cathedral at Coria", which is 70 ft. 8 in. between the walls; Zamora church, 60 ft. clear span between walls; Palma cathedral, 71 ft. between centres of columns, the three naves are 190 ft. wide with the chapels. Manresa collegiate church, and Valladolid cathedral (classic), 60 ft. between centres of columns. Tarragona cathedral, 52 ft.; Salamanca cathedral, Segovia cathedral, and S. Maria del Mar at Barcelona, are all 45 ft.; S. Benito, Valladolid, 42 ft.

In *Italy*: Milan cathedral, 63 ft. between centres of columns. Florence cathedral, 60 ft. wide. At Naples, Sta. Chiara is 104 ft. wide, with no aisles, by 270 ft. long: and the following churches consist of a nave only or with chapels: S. Lorenzo, Sta. Maria delle Grazie a capo Napoli, Sta. Maria la Nuova, Sta. Maria donna Regina, S. Martino, Monte Oliveto, and SS. Severino e Sossio.

Churches having a wide nave and narrow aisles: the church of Dominicans at Gand (1240-75), 53 ft. between piers. This is now being imitated in England; as at Clifton, by G. E. Street; and at Oxford about 30 ft.; at Manchester, by—Hansom, between 40 to 50 ft. Madura in Hindostan, 60 ft., aisles 10 ft. OTTE, *Kunst-Archäologie*, 8vo., Leipzig, 1854, p. 16, compares the widths of the nave with the side aisles of twenty-seven churches in Germany. He notices that in the church of S. Katherine at Lubeck, the north aisle is finished to a point at the west end.

Nave and aisles of equal height: S. Elizabeth at Marburg, 1253-83, probably the earliest instance, afterwards very common in Germany. S. Mary at Esslingen; the church at Luedinghausen, 1507-58; S. Catherine at Brandenburg, 1401; S. Mary at Ingoldstadt, 1425; S. Laurence at Nuremberg, 1439 or 1459-77; S. Nicholas at Zerbst, 1446-81; Munich cathedral, 1468-91; S. George at Noerdlingen, 1427-1505. Such an arrangement is very uncommon in the Rhine churches; but it exists at Mayence, S. Stephen, 1317, and S. Peter, *cir.* 1750, the nave is 36 ft.; Friedburg; Frankenburg; Grünberg; Welter; Alsfield; and Wetzlar.

Nave of equal width with aisles; S. Francesco, Bologna.

Nave but little larger than aisle; Freiburg cathedral.

Nave lower than the choir; S. Laurence at Nuremberg; Esslingen, Neumarkt in Silesia, Hythe church, Kent.

Nave same as chancel in width and design, and nearly of equal length; S. Laurence, Evesham.

Nave smaller than the aisles, both as regards height and breadth; Great Yarmouth church. Church at Cheux in Normandy, east of the tower, is somewhat similar; *ECCESTOLOGIST Journal*, iv, 289; COTMAN, *Normandy*.

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Two naves of equal dimensions in one building, one being reserved for the monks and divine service, and the other for preaching (VIOLETT-LE-DUC, *Dict.*), were erected in 13th cent. by the Dominicans and the Jacobins, amongst others: it was so at the abbey of Balmerino; ABBOTSFORD CLUB, *Chartulary*, 4to., 1841, x.

Nave divided in the centre by an arcade of three arches; Hannington, Northumberland; ASSOCIATED SOCIETIES, *Reports and Papers* 1868, ii, xvii. Westwell church, Kent.

Nave and chancel having no architectural distinction; North Walsham church, Norfolk.

Nave and two aisles on each side; in England—S. Mary at Taunton; S. Helen at Abingdon; at west end of Durham cathedral; Chichester cathedral; and Elgin cathedral, in Scotland. On the continent (one aisle being sometimes chapels); Ulm, Amiens, Rouen, Milan, Cologne, Bourges, S. Sernin at Toulouse, Mayence cathedral.

Nave and three aisles on each side; Nôtre Dame at Paris; Antwerp cathedral.

The length of the nave of the cathedral at Norwich from the west door to the transept is 250 ft.; Salisbury, 194 ft.; S. Albans, 300 ft.; York, 205 ft.; Winchester, 264 ft.; Canterbury, 221 ft.; Ely, 203 ft.; Peterborough, 226 ft.; Old S. Paul's, 280 ft.; New S. Paul's, 230 ft.

A paper on "wide bays" in a church, is given in *BUILDING News Journal*, 1870, xviii, 352.

NAXOS, now NAXIA. The chief town of the island of the same name in the Grecian archipelago, occupying the site of the ancient Naxos or Naxus. It is defended by a castle built by the Venetians, and was the residence of the dukes. THEVENOT described a temple to Bacchus in tolerably good preservation, which tradition calls a temple to Dionysus; but PITTON de TOURNEFORT, *Voyage du Levant*, 4to., Paris, 1717, i, 208, and transl., 8vo., London, 1741, i, 163, forty years later, describes only its western portal, and gives a sketch; it was of white marble, and of simple workmanship: BLOUET, *Morée*, fol., Paris, 1838, iii, pl. 24; the two jambs are each in one piece, 19 ft. high from the plinth, 4 ft. 10 in. square, and 11 ft. 4 in. apart; the lintel is about 21 ft. long; all the blocks are hollowed out at the back. In a marble quarry is an unfinished colossal figure about 34 ft. long. The fountain of Ariadne is still used. CHOISEUL-GOUFFIER, *Voyage Pitt.*, fol., Paris, 1782-1809, i, pl. 22. 14. 23. 50.

NAXOS or NAXUS. The most ancient Greek colony in Sicily. There are no remains of the city now extant. It was situated at the foot of the hill on which Taormenium, now Taormina, was afterwards built. 23.

NAYLTOYL. A tool of iron or a matrix in which nails were headed, 1465; as noticed in SURTEES SOCIETY, *Finchale Priory*, 8vo., Newcastle, 1837, p. 438.

NEAGLE (JOHN), was clerk of the works at the Tower of London, but superseded by Thomas Kynaston, 18th April 1715, by warrant under the king's sign manual.

NEALING, see ANNEALING.

NEAPOLIS. The modern NAPLES.

NEAPOLIS. A suburb of SYRACUSE.

NEATH. A word which occurs in HALFPENNY, *Practical Arch.*, 12mo., Lond., 1736, plate 43, 5th edit., and is supposed to mean a niche.

NEAT HOUSE, see CATTLE SHED.

NEBULE MOULDING. A decorated moulding, so called from the edge forming an undulating or waving line. It is introduced in corbel tables and archivolts in Norman architecture. 19.

NECESSARIUM. The PRIVY of ancient castles, and also of monasteries is thus called. Close to the outside of Roman towns in England are found numbers of deep and very narrow round wells, which, no doubt, are the remains of an arrangement for personal easement. They are numerous at Richborough and at Winchester; they often contain a great

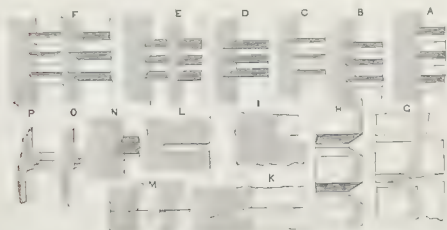
number of miscellaneous articles, and are often now called "rubbish pits": perhaps they were covered with a light structure: WRIGHT, *Celts, etc.*, 8vo., Lond., 1861, 2nd edit., 181, who refers to *Archæologia*, xxxii, for one at Ewell, by Dr. DIAMOND; and xxxiv, at Stone in Bucks, by AKERMAN. A privy at Rome, on the wall, A.D. 850 (?) near the Porta Salaria, is given in photograph, No. 669, of Parker's catalogue 1875.

The new *domicilium necessarium* at S. Alban's abbey was erected by abbot John of Hertford, *cir.* 1256. The extent and ingenious construction of the one erected in the fourteenth century at New College, Oxford, may be judged by the following: the interior dimensions are 81 ft. 10 in. by 16 ft. 2 in.; there are twenty-three enclosures arranged along the centre, each alternate one having the entrance from the opposite side; the height of the framework is 7 ft. 6 in.; the floor is supported by joists 11 by 8 ins., sustained by ponderous oaken girders, strutted and resting upon stone corbels, and not inserted in the walls; BUCKLER, *S. Alban's*, 8vo., Lond., 1847, p. 113. The windows of a similar building were filled with beautiful glass; *The Antiquities of Durham Abbey*, p. 78. The great necessarium at Christ Church, Canterbury, as derived from the existing remains now forming the cellars and wine bins of the canons, was described by WILLIS, at the Society of Antiquaries, 9th June 1853, but the account was not printed. On the north side of Magdalen College, Oxford, once occupied by stabling, etc., part of the front had ponderous buttresses for the double purpose of strengthening the walls and affording convenient recesses to the apartments; each buttress had communication with a deep sewer—the hollows of the buttresses were equal in width to the sewer, which is 26 in., and this, though now arched, was formerly covered with large, flat, and closely united rough stones, the inner wall being the basement of the superincumbent building, and the outer supporting the extremities of the buttresses; (BUCKLER) *On Magdalen College*, 8vo., Lond., 1823, p. 61.

Examples in French buildings are well illustrated by VIOLETTÉ-LE-DUC, *Dict.*, s.v., *Latrines and Prison*. He refers to one at Langley castle, Northumberland, as being four stories high. This last, as well as that at Southwell, in Nottinghamshire, is shown in TURNER, *Domestic Arch.*, 8vo., Lond., 1851-59.

NECK of a chimney, in the northern counties, is the same as what is usually called the "shaft" of a chimney.

NECK or NECKING. Under this term is now generally included all that portion of the upper part of a column in Roman and Italian architecture which is contained between the lowest annulet of the capital and its junction with the shaft. In some Grecian examples this joint is so fine as to be scarcely discernible, as in the temple to Minerva at Sunium, in the temple to Jupiter Nemæus, at the Agora at Athens, and in the principal temples at Agrigentum (M), are by two authorities from the temple to Concord). In other examples the joining shows a slight sinking or groove, as at the Parthenon (L), at the propylæum at Eleusis, and at Rhamnus (I). At the propylæum at Athens the joint is a groove recessed or chamfered downwards (N); at the temple to Theseus it has a double chamfer (K). At the temple at Corinth the necking consists of



three grooves, recessed downwards obliquely, and divided by fillets (U). At the great hexastyle temple at Paestum the neck-

ing consists of two grooves cut in the forms of long beads, and agreeing with the flutes of the shaft. The necking to the columns of the temple to Apollo at Bassæ is formed of three semicircular grooves divided by fillets, and a small and deeper groove taken out of the upper groove (C). The other illustrations represent the necking at the great temple at Paestum (A); the temple at Egina (B); two temples at Segeste (G); at Selinuntum (H); at that of Juno Lucina, at Agrigentum (E, as given by two authorities); and to Minerva, at Syracuse (F, as from two authorities); various other examples may be found. The earl of ABERDEEN, *Enquiry*, p. 154, remarks that the three grooves "are never to be discerned in works of later date"; BUILDER *Journal*, 1844, ii, 221, with illustrations. HYPOTRACHELIUM.

The Ionic order has rarely a necking, but some of the Grecian examples have a necking at some distance below the volutes, as at the temple to Minerva Polias (O), and to Erechtheus (R), both at Athens. 1.

NECKING. The astragal, or whatever may take its place, at the top of a shaft or pier (VIOLETTÉ-LE-DUC, *Dict.*, gives illustrations of this, s.v. astragale)—this is necessarily not the neck or modern hypotrachelion: it is the groove or grooves of Greek Doric—the astragal in Roman Doric and some Greek Ionic—of course when the astragal belonged to the shaft, the neck and rest of cap ought to be of different marble from the shaft. In modern work the necking or astragal is part of the capital. ASTRAGAL. COLLARINO.

NECK MOULD. A small convex moulding surrounding a column at the junction of the shaft and capital. It is also a similar member at the union of a finial with the pinnacle. 19.

NECROPOLIS. A Greek term meaning the city of the dead, and applied to cemeteries in the vicinity of ancient cities. It occurs once as a name to a suburb of Alexandria, lying to the west of that city, and where corpses were received and embalmed. The most remarkable are, those of Thebes, situated at Gournah; of El-kab or Eileithyia; of Beni-hassan; and of Madfun or Abydos; of Siwah or the Oasis of Ammon; all in Egypt. The necropolis of Cyrene is extensive; there are others at Vulci, Corneto, Tarquinii, and Capua. They have also been found in Lycia, Sicily, and elsewhere. At Tarentum the dead were buried inside the town, contrary to the custom of the Greeks; POLYBIUS. 25.

NECTANDRIA RODIEI, see GREENHEART.

NEDAM or NEDEHAM (JAMES), is mentioned 1st September, 14th Henry VIII, 1522, in a grant of protection to him as carpenter going in the retinue of lord Berners, deputy of Calais; and as master carpenter with the army beyond sea, 15th Henry VIII, he was paid 12d. per day. He succeeded Humphrey Coke in the office of king's carpenter, 14th April 1531 (22nd Henry VIII), and was promoted to that of surveyor of the king's works in the following year; JUPP, *History of Carpenter's Company*, 8vo., Lond., 1848 (of which company he was master in 1536), p. 167; 175-7. In the Privy Purse expenses of Henry VIII, edited by Sir Harris Nicolas, he was paid in January and October 1530, February 1531, for making a bridge at York Place. The *Arundel MS.*, No. 97, notices payments of £100 per month made to him, 1537-41, 29th to 31st Henry VIII, for defraying expenses of reparations at "sundry manors and places"; at Otford Knolle in Kent; Petworth in Sussex, and at the manor of More; at the Tower; for a scaffold in the hall at Westminster, etc. The *Addit. MS.*, No. 10,109, appears to be a *Book of Accounts*, 29th to 33rd Henry VIII; it records a new office for the king's surveyors by the "fyshe house" at Westminster; works at Greenwich, Eltham, Enfield, the Moore, Hunsden, S. Augustin's at Canterbury, Tower of London, Hatfield, Amphilh, where "the overseer and setter out of the work" was L. Bradshaw; Elyng(?), Oking(?), Chobham, Horsleyf, Westminster, Guildford, and Ledes castle: Nedam's signature occurs on fo. 173b, and he styles himself at the end "accountant, surveyor-general, and

clerk of the king's works"; he received per day 4s. riding costs, by water 20d.; 2s. for himself, and 6d. for a clerk. 1542-4, 34th and 35th Henry VIII, works at the privy gallery, are entries in the *Addit. MS.*, 7100, No. 81. Nedam probably died in 1546, and was succeeded in office by the L. Bradshaw above noticed.

NEEDLE (Fr. *chapeau*). In shoring, the horizontal timber placed under and across the wall of a house, when it is desired to take out the lower portion for some proposed alteration or to rebuild it. A hole is first cut in the wall, through which this timber is passed, which is then supported at both ends by upright timbers, sufficiently strong to bear the weight the needle is to support; care having been taken to provide a substantial foundation for them. The operation is called "needling" (Fr. *chevalement*). One of the most important examples of needling, was that performed at Bayeux cathedral, as detailed in DION AND LASVIGNES, *Cathédral*, 4to., Paris, 1861; and described by BURNELL, *Operations*, etc., read at Inst. of Brit. Archts., *Sessional Papers*, 1861. Iron bars have been used in place of heavy timbers when the piers are too small to be cut out with safety.

NEEDLE DOOR LATCH OR LOCK, see LOCK.

NEEM TREE, see MELIA.

NEGRETE (JUAN), with D. de Vergara, M. Aguirre, and J. de la Montaña, masons (*canteros*) who under J. de Alava, *maestro mayor*, undertook 1534 by formal agreement attested by a notary, to complete the necessary works at the cathedral at Salamanca, for the sum of 4,500 ducats, finding all the necessary materials. The contract was completed at the end of May 1538, to the satisfaction of R. Gil de Hontañon, who was then *maestro mayor*. 66.

NEGRI (GIOVANNI FRANCISCO), also a painter, was born 1593, and studied at Bologna. The cappella called the *tesoro* di S. Gennaro at Naples built 1608-70 is attributed to him, but was by F. Grimaldi. He died 1659. 5. 68.

NEGRONI (BART.); see NERONI (B.).

NEHRING (JOHANN ARNOLD), was a pupil of M. M. Smids, whom he surpassed. He entered the service of the elector of Brandenburg, and became *oberbaudirektor*. He built at Berlin the chapel of the schloss Copenick; one wing of the old schloss towards the water, with large windows after the manner of the Genoese palaces; the stone bridge over the river Spree; the observatory under the direction of Leibnitz; the royal stables, which were looked upon as models of their kind; and some other buildings which no longer exist. He designed 1685 the great *zeughaus* or arsenal, which was to have been in three stories; but, dying in 1695, only two were built by Gruenberg and Schluter; while J. de Bött added a balustrade, and made so many other alterations in the design as to make it his own, according to DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1851. The design of the parochial church, at Berlin, commenced 1695, is attributed to Nehring; the portal to Gruenberg, and the edifice completed 1707-15 by Gerlach. Nehring also designed the *cadettenhaus*, enlarged by Unger. 60. 68.

NEHRWALEH, or **ANHULWARA PUTTUN** in Guzerat. The ancient capital, and the Tyre, of Western India, situated on the small river Saraswati, a tributary of the Banas. It was founded by Bunzraj (746-96), and destroyed by Alla-ud-din about 1298. Though formerly having "eighty-four squares and eighty-four bazaars", only four relics remain; the brick towers of Kali, consisting of two strong bastions with a pointed arch; the remains of the old palace of Sid-raj, in which is a tank formed by the Mahometans from fragments of Hindu temples; the ruins of one of the markets, called the Ghee-ca-Mandavi, four miles distant from the gate; and the ruins of Anhulwarra, three miles distant from the gate, between which two is the modern city. Much of the materials was removed and re-used in building Ahmedabad. The new city of Puttun is not devoid of attraction, and contains the statue of Vansraj, of

white marble, 3 ft. 6 in. high, in the temple of Parswa; and the *Pothi-bindar* or library of the Jains, preserved with great jealousy in a subterranean chamber. Top, *Western India*, 4to., Lond., 1839, p. 144, 157, 222, 238, with two plates.

NEITRA or **NYITRA**. A city in the circle of the same name in Hungary, and situated on a river of the same name. The *schloss*, erected on an isolated rock, is the residence of the bishop. The cathedral within its walls consists of two buildings, the older part, which is small, is separated from the new one by twenty-four steps, and deserves notice for its style, and for some ancient remains. The town house is in the modern style. The Camaldolese monastery, founded by king Stephen of Hungary (999-1038), is suppressed and in ruins. 26.

NEJJAR (ALI), built the great mosque at Broussa or Brusa, and that at Adrianople or Edreneh, begun for Yidirim Bajazet, and finished by his son Mahmoud, while viceroy. Ali was old when sent by Mohammed to the Greek king at Constantinople, to repair the north side of Aya Sofia, which suffered from the effects of a great earthquake. He erected the four great buttresses, and a staircase of two hundred steps in one of them up to the leads, and the foundation for a minaret, which Mohammed II erected of six sides three years afterwards (1456). EVLIYA, *Narrative*, 4to., London, 1834-50, i, 57.

NEKOSSEUR. Designed the old mosque in the fort at Jounpur, completed 1398-9 for the emperors Abd-el-muzaffir, Ferozesah, and sultan Ibrahim of Jounpur. KIRROE, *Indian Antiq.*, fol. Calcutta, 1838, No. 2.

NEMAUSIS. The ancient name of NISMES, in France.

NEMEA. An ancient place between Argos and Corinth in Greece. It consisted of a sacred grove, which contained the stadium, theatre, temple, and other buildings. The temple was dedicated to Jupiter; its roof had fallen in, in the time of Pausanias. Besides a portion of the cella, there are three standing and several prostrate Doric columns, almost entire, two being 4 ft. 7 in. in diameter; one belonging to the outer range is 5 ft. 3 in. diameter, and about 34 ft. high; much of the entablature still remains. They are engraved in SOCIETY OF DILETTANTI, *Antiq. of Ionia*, fol., Lond., 1817, ii, pl. xv-xviii; and in BLOUET, *Morée*, fol., Paris, 1838, iii, pl. 71-5. At a small distance south are other remains of a Doric order; and traces of the theatre are to be seen.

NEMESIS or Goddess of judicial retaliation, Temple to. The epithet Adrastea given her, was taken from Adrastus, king of Argos, B.C. 1304 (?) who first erected a temple to that deity. The temple best known is at RHAMNUS, where the marble statue of this goddess was the most famous work of Agorakritos, a pupil of Pheidias.

NEMETACUM and **NEMETOCENNA**. The ancient names of ARRAS, in France.

NEMOURS (the Latin NEMUS). A town situated near Fontainebleau in France, and almost surrounded by the canal and the river of Loing, over which is a bridge, described in BOISTARD, *Recueil sur les ponts de Nemours*, 4to., Paris, 1822. There is a good church; and the remains of the old castle of the dukes.

NEOMAGUS and **NOVIOMAGUS**; see LISIEUX, in France.

NEPHRITE. A mineral; see JADE.

NEPI (the ancient NEPETE in Etruria). A town in the delegation of Viterbo, in Italy. It has Gothic walls with towers and battlements, partly erected on Etruscan work; and some rock-cut sepulchres are still visible; DENNIS, *Etruria*, i, 111. The fortress and streets were laid out in the sixteenth century by A. San Gallo (VASARI, *Vite*, 8vo., Fir., 1854, x, 67). The city was almost entirely burnt by the French army in 1798. A bishopric, which still exists, was founded at Nepi in the time of S. Peter; its first bishop was S. Romano. A.D. 46. The *duomo*, dedicated to SS. Tolomeo e Romano, has an ancient crypt, *cir.* 1180, much resembling that in S. Gre-

gorio at Spoleto. The church was rebuilt 1266, as stated in an inscription; the atrium, etc., in 1647; a fifth nave in 1752; and was again rebuilt in the Renaissance style after the fire of 1798: it comprises nine parallel ailes, each of four oblong bays, the centre aile and last but one on each side ending in an apse. Some caps are carved with grotesque animals. Along the outer walls is a stone seat. Towards the north-west is a square brick tower, with a square tall pyramidal spire, later than the church; WEBB, *Ecclesiology*, 470. There are several parish churches dating in and from the sixteenth century. The town hall has a façade decorated with statues and ancient inscriptions. There is also a modern aqueduct of merit. NARDINI, *La Cattedra—in Nepi*, Roma, 1677. RANGHIASCI, *Memorie di Nepi*, Todi, 1845. 12. 50. 96.

NEPTUNE, Temple to. This god was called Poseidon by the Greeks. His worship was very general. He was usually represented sitting in a chariot made of a shell, drawn by sea-horses or dolphins, or erect holding a trident, his peculiar sceptre, drawn by winged horses, and attended by the Nereides and Oceanides. A fine colossal statue of this god is preserved in the museum of the Lateran (BRAUN, *Rome*, 1854, p. 442): and a fine head discovered at Ostia, is now in the gallery of the Belvedere, both at Rome.

Among the better known temples to this deity, is that at Egæus; that (cir. B.C. 36) in the piazza di Pietra, at Rome, erected by Agrippa, eleven pillars of which now probably form the façade of the papal dogana (BRAUN, p. 62); at Asomata, in the Ionian Islands; and at Pæstum: PAUSANIAS, viii, c. 10, notices a temple built by Hadrian to Neptune, near Mantinea, round the old one; there are also the remains of a temple at Nettuno in Italy, from which the town is named; at Samicum, noticed in BLOUET, *Morée*, i, 53; and two at Sparta, ii, 63. A temple to this deity in England is described in ROUSE, *Sussex*. 59.

NEPVEU (CHARLES FREDERICK), born 14th July 1777, at Paris, became a pupil of Percier and Fontaine, and afterwards visited Italy. His first public appointment was in 1807, as contrôleur des bâtiments de la couronne, as assistant to Hurtault, who was attached architect to the château de Fontainebleau, which post Nepveu held until the return of Louis XVIII, when he was succeeded by M. Pacard. In 1821 he was appointed to the palace of Rambouillet, as architecte du roi, where he preserved many parts from decay, and improved others, until 1832, when he was transferred to Versailles, and appointed by king Louis Philippe architect to Compiègne, where towards the end of the year he improvised in forty-eight hours a theatre in the tennis court, on the occasion of the marriage of the king's daughter to the king of the Belgians. He was also extensively employed in private practice by some of the noblest families in France. During Nepveu's appointment at Versailles, he, under the direction of the king, transformed the cellular labyrinth of small apartments into handsome and spacious picture galleries, lighted from above, and the low floors and entresols into lofty storeys, as now seen, leaving the exterior untouched. These works were inaugurated 1837; the old salle d'opéra, which had been abandoned, having been restored, and the theatre renovated. He retired when seventy-two years of age, and was succeeded by C. Questel, but continued to reside at Versailles, occupying himself by completing and putting in order ten volumes of drawings, and fifty of accounts, connected with his operations at the palace. He died there 28th Sept. 1862, in the 86th year of his age. He was a member of the legion of honour. Memoir by T. L. DONALDSON, read at the Inst. of Brit. Archts., 3rd Nov. 1862.

NEPVEU (PIERRE), called Trinquenau, of Blois, is considered to have designed 1526 (1536-37, LANCE), the château de Chambord, and was succeeded by Jacques Coqueau. He had worked at the château de Blois for Louis XII; and is supposed to have been called 1490 to Amboise by Charles VIII,

when he began building the château there. COMITÉ HISTORIQUE, *Bulletin*, 8vo., Paris, 1843, ii, 470-1. DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1856, lv.

NEQUINUM; see NARNI in Italy.

NERETUM; see NARDO in Italy.

NERIS (the ancient AQUÆ NERI). A town near Moulins, in the department of Allier, in France. During the Roman occupation it was a place of considerable importance; remains exist of an extensive AMPHITHEATRE, AQUEDUCT, baths, temples, and palaces, and mosaic pavements, statues of marble and bronze, with coins, etc., have been dug up at various times. There are still mineral baths of a temperature from 113 deg. to 122 deg. Fahr.

NERO ANTICO. The name of the celebrated black marble of the ancients. The *Grand antique black marble*, a breccia black and white, very pure, with great spots broken up by zigzag lines; is extremely rare. Some fine specimens are in the museum of the Capitol; but the largest masses in Rome are a pair of columns in the church Regina Cœli, and a table in the palazzo Altamps. The *Little antique black marble* has smaller spots, and the black approaching to gray. The quarries of these two marbles, supposed to be lost, were found by Laverle Capel, at Aubert, arrondissement de S. Giron (Arrière), in France. CLARAC, *Musée, etc., du Louvre*, 8vo., Paris, 1841; transl. in CIVIL ENGINEER, etc., *Journal*, ii, 452. It was used in the mausoleum of the emperor Napoleon I; CHATAUD and LEJEUNE, *Tombeau*, 12mo., Paris, 1853. BLACK MARBLE; BERGAMO MARBLE; EGYPTIAN BLACK MARBLE; PARAGONE; and PANNON DI MORTE.

NERUNKOT. The former and ancient principal town of Scinde, in the north of Hindostan; on nearly the site of which was built HYDERABAD.

NERVEN (CORNNILLE VAN), also a sculptor, admitted 1697 a member of the society of sculptors at Bruxelles, designed 1706-17 the rear part of the hôtel de ville, at Bruxelles, destroyed in the bombardment of 1695: it cost 148,300 florins, equivalent now to about a million of francs. Also the *poids de la ville*, 1706; and the chapel of Notre Dame du Rosaire, adjoining the church of the Dominicans, completed 1700. COMMISSION ROYALE D'HISTOIRE, *Bulletin*, 8vo., Brux., 1818, xiv, 91; xv, 182.

NERVURES (Fr. *Nerfs en ogive*). A name given by some French architects (and called Nerves by some English writers), to the ribs bounding the sides of a groined compartment, as distinguished from the ribs which diagonally cross the compartment. 19. 25.

NESE (CELLINO DA), finished some years after 1337 the Italian Gothic exterior of the baptistery at Pistoia, begun by Andrea Pisano. BUILDING NEWS *Journal*, 1869, xvi, 66. TOLONEI, *Guida*. 28.

NESSOTROPHIUM (Gr.). A place in a Roman villa for breeding ducks and other similar birds. A flat piece of ground, sometimes marshy, was enclosed by a wall 15 ft. high, well plastered on both sides; on an elevated ledge were made a course of stone nests covered in, and the space above covered over with a net or trellis work. A shallow pond was dug in the middle of the enclosure, the margin paved with small stones, and planted round with shrubs. A small stream flowed through the pond, into which was thrown the food. 78.

NEST. A very interesting notice of the various forms of building adopted by beasts, birds, fishes, reptiles, and insects, is contained in the QUARTERLY REVIEW, 8vo., London, 1866, No. 240 (October), p. 355-59. SMIRKE, *Architecture of the Honey Bee*, paper read at the Inst. of British Architects, 13th June 1853. LIBRARY OF ENTERTAINING KNOWLEDGE, *Insect Architecture*, 8vo., Lond., 1830, 2nd edit.

NET. A term used in trade for exact measure or amount, no allowance being made for waste of materials, or for reduction of price.

NETTLE TREE; see CELTIS and LOTE.

NET TRACERY. A very simple and beautiful form of tracery of the Decorated period of Gothic architecture. It has little variety of detail, consisting of a series of loops resembling the meshes of an extended net, each loop being quatrefoiled. Many large windows of five and six lights are thus filled. Its peculiarity is that it admits of no central pattern or principal geometric figure. Examples occur in the east cloister of Westminster abbey, engraved in CAVELER, *Select Specimens*; at the east end of a chapel adjoining the west gatehouse in the precinct of Peterborough cathedral; and at Reading priory, given in the *Glossary*, pl. 246. PALEY, *Manual of Gothic Arch.*, 12mo., Lond., 1846, p. 180.

NEU-BRANDENBURG. A town in Mecklenburg-Strelitz. It is but little visited; a description of the peculiarities of its buildings, which date from the end of the 13th century, by PERRY, *Medieval Brickwork of Pomerania*, is printed in *Sessional Papers of the Royal Inst. of Brit. Archts.*, 17th Nov. 1873.

NEUHAEUSER (HERMANN), of Münster, was *baumeister* at the münster at Freiburg. He died 1524. 92.

NEULLY (JACQUES DE) perhaps of Nuilly lès Dijon, one of the masters of the works to Philippe le Hardi, duc de Bourgogne. He was called 1376 to visit the works of the duke's hotel at Dijon; and in 1387, those of the Sainte chapelle of the same building. In a certificate dated 14th Sept. 1392, he is called "masson ouvrier de M. d. S. le Duc"; while in one of 27th October 1396 he is called "mestre des œuvres de massonerie". At the end of the fourteenth century, Philippe le Hardi made in his palace at Dijon a large hall, a large tower, and a treasury, which works were directed by this architect. CANAT, *Maitres*, etc. LANCÉ, *Dict. Biog.*

NEUMANN (FRANZ IGNAZ VON), born in 1733, designed the abbey church at Schwarzach; and it is said the *dom* at Speyer, but this last is not by him. A fire in 1756 having destroyed the roof of the western tower, including all the smaller towers of the cathedral at Mainz; and in 1767 roofed them with stone, as well as the whole of the west end; and probably designed the conservatories and stables at Seehof, superintended by C. Fink. He died in 1785, aged 52 years. 68. 69.

NEUMANN (JOHN BALTHAZAR), born 1687 at Eger in Bohemia, went to Würzburg as a plasterer and bell founder. He entered the military service, and became 1744 captain of artillery. Liking mathematics and architecture, he while on his travels in Germany, Netherlands, France, and Italy, studied the best works of ancient and modern art, and thus introduced a better style. One of his best works is the church at Neresheim, painted by Knoller. He designed the chapel of the palace at Würzburg, and the mausoleum of the counts of Schönbrunn, also the church 14 *Heiligen*, at which Thomas Nistler and his two stepsons, Caspar and Sebastian Weber, were occupied for thirty years as masters of the works: the churches at Schwarzach and Gösweinstein; the parish church of Holfeld; with plans for the unfinished church of the German order at Nuremberg; and nearly seventy other churches, schlosses, chapels, and family residences. He also built the residences of the princes at Bruchsal, Würzburg, and Werneck, and the country palace of the Schönbruns at Coblenz. His design for the new imperial residence at Vienna was not carried out, but is still preserved there. He died in 1753. 68.

To Neumann is attributed the design of the magnificent episcopal palace at Würzburg begun 1720 for the prelate of the family of the counts of Schönbrunn, but stopped at his death in 1724. DUSSTREUX, *Les Artistes Français*, 1856, p. 101, intimates that R. de Cotte modified the plans, and that G. Boffrand altered the plans and designed the elevations. A view of the staircase is given in ILLUSTRATED LONDON NEWS, 1845, vii, 172, the decorations are by Dieppolo, whose presumed portrait appears in the paintings on the ceiling; and he painted the dome of the fine *Kaiser halle* therein.

ARCH. PUB. SOC.

NEUSTRA SENORA, OR STA. TRINITA, DE BUENOS AYRES. The capital of the province of the same name, one of the united provinces of La Plata or the Argentine republic, and situated on the estuary of the river La Plata. It was founded 1535, and was the seat of a viceroy in 1776. The streets intersect each other at right angles at every 150 yards. The old houses are built of sun-dried, the later ones of burnt, bricks. The windows are often without glass, but have an iron grating called *reja*. The floors are principally of brick, wood being avoided as much as possible. Under the larger houses are tanks in which is collected the rain water falling on the flat roofs. The principal square contains the viceroy's palace, the townhall, and the cathedral, dedicated to S. Martin, which has a cupola and a good portico. Among other public edifices are the churches of S. Francis, and of S. John, used by the Christian Indians; a college with an observatory, and a large theatre erected 1855, the iron work for the roof having been made in Dublin. A new custom house and public offices erected on the site of the old fortress, from a design by Edward Taylor of Buenos Ayres, is given in *Builder Journal*, 1856, xiv, 370; he also erected the timber mole 450 yards long, and to be extended to 700 yards. The bronze doors for a bank were executed in London, July 1873; they were 17 ft. 4½ in. high, 7 ft. 1 in. wide, and weighed upwards of three tons each. A large strong-room by Messrs. Hobbs, for the Mercantile Banco, is illustrated in *Engineer Journal*, 17th Sept. 1875. A very hard and durable wood of Buenos Ayres is called Nandebunay; and others used (1862) for joists and laths are named Urunday, Quebracho, and Algarroba. PARISH, *Buenos Ayres*, etc., 8vo., 1838. BLACKIE, *Imperial Gazetteer*, 1850, gives a plan. 50.

NEUSTRA SENHORA D'ASSUMPCAO, see ASSUMPTION OF ASUNCION.

NEUTRAL COLOUR. Between the extremes of black and white exists an infinite gradation of shades and mixtures, which are called greys, affording a scale of neutral colours. It is also a colour composed of the three primary colours in equal proportions, and grey in tint.

NEUTRAL TINT. A mixed pigment of the class of gray colours, and variously composed of sepia and indigo and other blues, with madder and other lakes, and intended for water colour painting only, in which they are found extremely useful.

NEVERS (the Latin AUGUSTONOMETUM, NOVIODUNUM, and NIVERNUM. The capital of the department of Nièvre in France, and situated on the river Loire, over which is a bridge built of the fine greyish red stone from the Coulandon quarries. A gatehouse is given in *Illustrations*, s.v., pt. i, 1859; and there is a triumphal arch at the entrance from Paris: a fortified gate is given in VIOLLET-LE-DUC, *Dict.*, s.v. *Porte*, with three woodcuts.

It is the see of a bishop, founded in the fourth century. The cathedral is dedicated to SS. Ciriaco e Giuditta martire. The crypt and chapelle de Ste. Julitte are of the eleventh century; the nave is nearly entirely in the *style ogivale primitive*; the choir and three absidal chapels in the *style ogivale secondaire*; and the side chapels in the *style ogivale tertiaire*. Robelin of Nevers was charged before 1840 with important works in this building. The tower called "*magnifique*" is square, and richly decorated with statues and sculpture. The church of S. Genest (transition to Pointed) is in the form of a Greek cross. The church of S. Etienne (Romanesque), is of the eleventh, and the apse of twelfth, century; (see JUGGLE JOINT of west door). The church of S. Sauveur (twelfth century), fell of itself, as stated in the *Report of the French Historical Commission*, reprinted in the GENTLEMAN'S MAGAZINE, February 1840, and CIVIL ENGINEER etc. *Journal*, iii, 171: described in RAMÉE, *Histoire*, 8vo., Paris, 1843, ii, 172. VIOLLET-LE-DUC gives numerous illustrations in his *Dict.*, from these churches. An old castle of the dukes is now used as the courts of Justice. The hôtel

de ville (Flamboyant, late in the 15th century), formerly the residence of the dukes of Nevers, was restored shortly before 1859. The former episcopal palace is now occupied by the prefect of the department. The college was founded 1525. DUVIVIER, *Nevers*. 14. 50.

NEWBALD. A village ten miles from Beverley, is supposed to be the place whence stone was supplied for the eastern part of the minster of that town; Poulson, *Beverlac*, 4to., Lond., 1829, p. 679. The western portion was erected of stone from a "quarry within the manor of Hasslewood", LELAND, Hearn's edit., p. 103.

NEWBRIDGE, near Newport in Monmouthshire. Here are the Abercarne quarries, also called Newbridge; which supply a sandstone, described as composed of quartz and siliceous grains moderately fine, with argillo-siliceous cement; micaceous, and with remains of fossil plants. It is of a dark bluish grey colour; weighs 167 lb. 15 oz. per cubic foot; and supplies blocks from one to ten tons in weight, in thicknesses of 5 ft. The old churches and modern buildings in the vicinity, and the new docks at Newport and Cardiff, are built of it. Commissioners *Report on Stone*, 1839. GWILT, *Encycl.*, edit., 1867, p. 459.

NEWBRIDGE, a village in Glamorganshire, situated on both sides of the river Tâf, which is crossed by the celebrated bridge called Pont-y-tu-pridd, erected by W. EDWARDS.

NEWCASTLE, formerly called Kingston. A seaport town in New South Wales, on the river Hunter. A design for the cathedral, by J. Horbury Hunt, of Sydney, is given in *Building News Journal*, 1871, xxi, 286. A modified plan was adopted. The nave was to be 51 ft. wide between the centres of the columns, with aisles only 5 ft. wide, and an outside cloister.

NEWCASTLE GLASS was that species of crown glass for windows made and most used in England, as being the best, after the establishment of its manufacture there about 1728. It was of an ash colour; the best and second was subject to specks, streaks, and other blemishes, and frequently warped: the third was inferior, and of a greenish hue. It was superseded from 1830, by the improved make of sheet glass. GLASS.

NEWCASTLE-UPON-TYNE. The capital of the county of Northumberland in England. The important edifices are the church of S. Nicholas (Decorated English), with a tower (late Perpendicular), having a spire supported on flying buttresses (which see); the castle, one of the finest specimens of the Norman keeps in England: the grand high level bridge across the river Tyne for railway and other traffic; the central railway station, by J. Dobson, 1849 (CIVIL ENGINEER, etc., *Journal*, xi, 97); the memorial column to earl Grey, erected 1838, 121 ft. high, the statue with its plinth 14 ft. more, is by E. H. Bailey, R.A.; and Grey Street, which was constructed by Mr. Grainger, together with others, and the buildings in them, during five years, to the amount of nearly a million sterling.

MACKENZIE, *Newcastle*, 4to., 1827. HANN and HOSBING, *Bridges*. ROSE, *Northumberland*. BRAND, *Fifteen Views* by Fittler, 4to., 1781; and 1789. SOPWITH, *Guide*, 1838. FOWLER, *View of the Steeple*, 1818. RICKMAN, *Gothic Arch.* MURRAY, *Handbook*. 14. 50.

NEWEL (Old Engl., *Noel*, *Nowel*, and *Nuel*; It., *Albero di scala*; Span., *pilar de escalera de caracol*; Fr., *noyau, vis à noyau plein et à plomb*; Ger., *spindel*). The upright cylinder post, or pillar, round which, in a winding staircase, the steps turn and are supported from the bottom to the top, themselves forming part of the pillar: hence called "newel stairs". "Noyau, the nuell or spindel of a winding stair"; COTGRAVE. "Thirteen stones of Reigate for the work called nowells for the same vice"; 1365, Westminster Roll, BRAYLEY, *Houses of Parliament*, 188. Where the steps are pinned into the wall and there is no central pillar, the staircase is said to have an *open newel*, or *HOLLOW NEWEL*: those of a large size are called

GEOMETRICAL STAIRS (Fr., *Escalier en vis ronde ou noyau vide*). VICE (Fr., *vis*) is a term often applied to the small winding stairs, from the circular pillar, so common in Gothic buildings of all periods, as to a church tower, or to a turret in a house. BLONDEL, *Cours*, iv, 292. 5. 17.

The term is also applied to the principal post at the angles, and foot, of a square staircase; the latter to support and give strength to the handrail.

The room over the gateway at Thornton abbey, Staffordshire, is approached by newel stairs in one of the turrets, the top of which has a very good groined vault with foliated ribs of singular but elegant design: the gateway was built soon after 1382: a cut of the vault is given in TURNER and PARKER, *Dom. Arch.*, 8vo., Lond., 1859, iii, 231. In the northern parts of the kingdom, the newel is sometimes continued above the upper step to the vaulting of the roof, and supports a series of ribs which radiate from it; as at Peterborough and Carlisle cathedrals, Helsey, Warkworth, Alnwick, and Edingham castles. At Fyvie castle, in Scotland, is perhaps the largest circular staircase in Britain—a coach and four might be driven up it, and the steps are so long as to necessitate a series of triangular vaultings for their support. At Glamis castle the newel is hollow, and at every floor there is a doorway for drawing up water to the different storeys: BILLINGS, in ARCH. INST. OF SCOTLAND, *Transactions*, 1852, iii, 32, 352, and his *Baronial Antiquities*. A newel in the museum at Angers, is shown in *Illustrations*, 1849-50, pl. 36; and at Blois, 1863-65.

A newel of timber about 60 ft. high, richly carved, occurs in the house No. 14 rue des Nobles at Morlaix, in Brittany; BREWER, *Churches of Brittany*, read at Inst. of Brit. Archts., 21st April 1873, p. 169. The "oak newel which runs up the entire staircase" at the gateway of Layer Marney hall, Essex, *cir.* 1520-5, is a fine example of about the same length.

An ancient form of newel stairs occurs in a Doric temple at Selinuntum, in Sicily: and one of the Roman period is shown in TEXTER, *Asie Mineure*, fol., Paris, 1859-49, pl. 3.

As an example of an open newel or geometrical staircase, that at Blarney castle in Ireland, is deserving of attention. The arched rubble work forming the steps of wheel staircases, which are without solid newels, appear to have been cast or turned on frames of osier or wicker work, of about 8 to 10 ft. long, the marks of which are still to be seen; in this mass of concrete arched ceiling work were notched the treads and risers of the stair, all being lined with thin slabs of grey limestone, polished by friction, like those at Kilcrea—the same sort of work may be observed in the old cathedral at Limerick. It is under 4 ft. 6 in. diameter: ARCH. INST. OF SCOTLAND, *Trans.*, 1852, ii, 285.

NEW GRANGE, near Drogheda, in Ireland. The most interesting relic of antiquity there, is described *s.v.* CAIRN; further publications are, WAKEMAN, *Handbook to Irish Antig.*, 12mo., Dublin, 1848; reviewed in *Builder Journal*, 1852, x, 481. D'ALTON, *Essay on the Ancient History*, etc., p. 286.

NEWMAN (JOHN), (F.S.A. 1830-49), was born 1786 in London, of a city family, his grandfather having been sheriff in 1789-90. He held an appointment in early life in the office of the clerk of the Bridge House Estates, and succeeded him, retaining the situation for upwards of thirty years. He was employed (1809) under Sir R. Smirke in the erection of Covent Garden theatre; and (1823-29) at the general post office. He designed 1817-20 the Roman Catholic chapel, Finsbury Circus, 125 ft. long, 98 ft. wide, and 52 ft. high, erected at a cost of £26,000 including the decorations (BRITTON and PUGIN, *London*, 8vo., Lond., 1822, ii); the Islington proprietary school; and 1834-38, the school for the Indigent blind, S. George's Circus, Southwark, 569 ft. long, which is fully described in CIVIL ENGINEER, etc., *Journal*, 1838, i, 207-12; and the terrace of houses forming Duke Street, London Bridge, with the large wharves and warehouses at

the back facing the river, erected on the alteration of the line of the bridge; and he was concerned in the valuation of property for this, and other improvements, railways, etc. Mr. Newman was from about 1815, and for nearly thirty years, one of the three surveyors in the commission of sewers for Surrey and Kent, and joined the others in the *Report relating to the sewage, etc.*, 8vo., Lond., 1843: also surveyor to the commissioners of pavements and improvements for the west division of Southwark; to earl Somers' estate at Somers' Town, S. Pancras; honorary architect to the royal Literary fund from 1846: and to the society of patrons of the charity children's anniversary meeting in S. Paul's cathedral. He had formed a valuable collection of Roman antiquities, found in London, the river Thames, etc.; from which a bronze head of Hadrian is now in the British museum, the collection having been sold by auction in 1848. A miniature of him was taken in 1821, by — Robertson. He was a fellow and one of the founders of the Institute of British Architects, and originated the travelling fund, but retired in 1851. He died at Passy near Paris, 3rd January, 1859, aged 72 years.

His son, ARTHUR SHEAN, was born in 1828, at the Old Bridge House, Southwark, and succeeded his father as surveyor to the society of patrons of the charity children's anniversary; as architect to the deaf and dumb asylum, and to various public bodies. In 1858 he took into partnership Mr. Arthur Billing, in conjunction with whom he erected a number of churches in and around London, including the large church and schools in Charlton Street, Somers' Town, for George Moore, esq.; many rectory houses, large warehouses, and works in different parts of the country, one of the last being the restoration of Stepney parish church. He died 3rd March 1873, leaving a son Arthur H., who has joined the same profession.

NEW ORLEANS. A city and port of Louisiana, one of the United States of America. It was founded by the French in 1717, abandoned, but again settled 1722, and was the capital of the state until 1849. Situated on a swamp, part of the delta of the river Mississippi, it is not more than 9 ft. above, and is in parts several feet below, the level of the river; from which it is separated by a strong embankment about 100 ft. wide, known by the name of the Levee. The town is about 6 miles long and $1\frac{1}{2}$ miles wide. The water works were commenced 1820, by B. H. Latrobe; and introduced 1836 by Albert Stein: the reservoir is 250 ft. square, holding 4,000,000 of gallons. There are six public squares, which are well laid out with shady avenues; Canal, Rampart and Esplanade streets are 200 ft. wide; Canal street was being improved in 1860, by which it would be eight miles long, and nearly 200 ft. wide with a parterre promenade in the centre 40 ft. wide: at the crossings were to be fountains or monuments. A bronze equestrian statue of gen. Jackson is by Clark Mills: a colossal gilt bronze statue of Henry Clay was inaugurated 12th April 1860. The S. Charles hotel was built 1837 (LOUON, *Arch. Mag.*, 8vo., Lond., 1837, iv, 545), burnt 1850, and rebuilt 1852, to contain between 1000 and 1100 rooms, at a cost of £150,000 (BUILDER *Journal*, 1851, ix, 602; xvi, 413); it has a lofty dome. The S. Louis hotel is 300 ft. long and 120 ft. deep, with a fine rotunda, the ceiling richly painted. The S. James 1860, and the City, hotels are also spacious edifices. The new city park is 150 acres in extent.

Of the twenty Roman Catholic churches, the cathedral of S. Louis is a large Gothic edifice erected 1850; and there are about forty other churches, among which are a Methodist church after the temple to Theseus at Athens, with a steeple 170 ft. high; and the second Presbyterian church with a large Doric portico. There are about seventeen cemeteries. The soil being completely saturated with moisture, burial underground is never attempted except in the Potter's field for poor or friendless strangers, whose remains, after being there deposited in a pool of water are not unfrequently swollen by it, forced out of their

narrow cells and left to moulder on the surface. The other cemeteries consist of vaults above ground, with arched cavities in which the bodies are arranged above each other in walls 10 ft. thick, to the height of 12 ft.; the mouth of each cell when filled is hermetically sealed. The university was founded 1849; it occupies a centre and two wings. A branch United States mint (Ionic) is 282 ft. long, with two wings each 81 ft. long. The custom house 1848-61 (and still unfinished), built of Quincy granite, is one of the largest and most massive in the States, the fronts being respectively 334, 310, 296, and 251 ft. long, and 85 ft. high, it will contain apartments for the United States court and for the Government. The principal room will be 116 ft. by 95 ft., lighted from an iron dome, supported by fourteen Corinthian columns. The old Spanish government house is in an antique style. A very large hospital 1812, is principally for fever cases. The new marine hospital, 1855; the plan and specification are given in *Plans of Public Buildings*, 8vo. and fol., 1855. The penitentiary, about 1820 was by R. Mills. Most of the eleven banks deserve notice. The theatre of S. Charles, by James Caldwell 1837 has five rows of boxes, with forty-seven boudoirs attached to them, and a grand saloon 129 ft. long by 26 ft. wide; Loupon, *Arch. Mag.*, iv, 545: the Orleans or French, 1859; and the American, hold about 4500 persons. Some of the largest and most costly structures are the cotton presses. The Orleans press occupies a space of 632 ft. by 308 ft., and stores 25,000 bales. RIPLEY and DANA, *New Amer. Cyclo.*, 8vo., New York, 1861. *Visitor's Guide*, by Appleton, 8vo., 1876. 50.

NEW PAPHOS, see PAPHOS, in Cyprus.

NEW SOUTH WALES. The capital of this colony is Sydney. The timber to be obtained is described in *BUILDER Journal*, 1847, v, 125; and a collection of woods is given in *Reports of Jurors, Exhibition of Industry of all Nations* 1851, p. 147-8.

NEW YORK. A seaport of the State of the same name, and the commercial capital of the United States of North America. It was first settled by the Dutch in 1609, but given up by the British in 1783. It is built on the south part of Manhattan island, and separated from the main land on the north-east by the Harlem river; the estuary of the river Hudson separating it on the west from the city of Jersey, almost a suburb; the channel called the East river on the south-east, separates it from its important suburbs of Brooklyn and Williamsburg, both situated on Long island; while on the south is the bay. The city is compactly built for about 5 miles, and about $1\frac{1}{2}$ miles wide. The old part is to the south; the avenues of the new part run from north to south, and are about 100 ft. wide; the streets crossing them are 60 ft. wide, every tenth one being 100 ft. The main thoroughfare and great boast of the city is the Broadway, a street varying in width from 35 to 44 ft. 8 in. and 80 ft. in the new part; for $2\frac{1}{2}$ miles, terminating at 14th street, it is nearly straight, then turning nearly due north it extends to a total length of about six miles: it contains public buildings, hotels, mansions, stores, and shops, mostly deserving notice. The wharf line on the rivers was $28\frac{1}{2}$ miles long in 1870, with a pier area of 2,322,668 square feet. A river wall was commenced in 1873, to form a river street 250 ft. wide along the North river, and 200 ft. wide along the East river. The city suffered greatly in the fires of December 1835, and of 19th September 1845 in the Broadway. There are numerous open spaces, from the Battery of eleven acres; City Hall park; Union Square; Madison Square of ten acres, and others, finishing with the Central park of 843 acres, which was remodelled from 1858, by C. Vaux and J. W. Mould, his assistant: within it are the menageries, aviaries, museum of natural history, etc. *BUILDER Journal*, xvi, 660; a description, with view is given 1860, xviii, 697; a plan and views in *ENGINEERING Journal*, for 13th Nov. 1868, p. 429. BELLOWES, *Descr.*, 4to., N. Y., 1869. The fountain has a basin of 100 ft. in diam., and

a jet of 70 ft. in height. To remedy the want of a proper water supply, and to meet the case of fire, the Croton water-works were commenced in 1835, and have not been surpassed. They are described in *Detached Essays*, Aqueduct, p. 18, pl. iii, fig. 4; in *SCHRAMKE, Description*, 8vo, New York, 1846; *TOWERS, Illustrations*, 4to., N. Y., 1843: and *CIVIL ENGINEER*, etc., *Journal*, i, 117. The grand central depôt (railway) has a west front (Italian) 700 ft. long, "imposing from its size and regularity, unusual in the buildings of this city; the car house is of three acres, spanned by one arched roof". City railroads or horse tramways are numerous; and there is one "elevated steam railway" at the battery. A bronze equestrian statue to Washington, is 29 ft. high with the pedestal; a statue to A. Lincoln; and an obelisk to general Worth, 1857, has an equestrian image in relief on one side.

Hotels are much used as domestic establishments in New York; there are nine large ones and fifty others varying in size. The Astor, 1839, of Quincy granite, 201 ft. long, six stories high, contains about 400 rooms; it cost over £200,000: the dining room is 108 ft. by 42 ft.; the ladies' ordinary has "one of the finest frescoes in the world". The Metropolitan, 1844, is 278 ft. by 60 ft., and six stories high, (B. J., x, 630). S. Nicholas, 1844, 275 ft. by 200 ft., having 900 to 1000 rooms (B. J., xiv, 520), cost 1,500,000 dols., and 500,000 dols. to furnish. Grand Central, 1870, for 1500 guests in 650 rooms (B. N. J., xix, 233). Cooper house, 1851, for 600 beds. S. Germain, 1856 (B. J., xiv, 168). Fifth Avenue, the most expensive, is of white marble and fireproof, six stories high, for upwards of 1000 guests. A. T. Stewart's hotel for working women is "a superb iron structure of immense size and profuse ornamentation". A monster lodging house, 1853, 200 ft. square, to accommodate about 1000 persons, is described in *CIVIL ENGINEER*, etc., *Journal*, xvi, 232.

About seventy churches deserve notice out of the 250 of various denominations, and of the twelve synagogues the one in Fifth Avenue is the chief. Among the Episcopal churches, are Trinity church, (Perpendicular Gothic) rebuilt 1841-46, by R. Upjohn, of brown or New Jersey sandstone, 192 ft. long and 84 ft. wide (or 104 ft. by 72 ft.) at a cost of £80,000: it will only accommodate about 900 persons; the tower and spire are 264 ft. high; at the time of its erection it was the best specimen of Gothic in the States. Grace church (Gothic) 1845, by J. Renwick, of white marble, cost about £40,000. S. John's chapel, 132 ft. by 80 ft., with a Corinthian portico and a spire 215 ft. high. Trinity chapel, 180 ft. by 54 ft. has a Caen stone interior and movable seats. S. Paul's, 151 ft. by 73 ft. with a spire 203 ft. high, all of brown stone. S. George, 1849, by Blesch and Eidlitz, 170 ft. by 94 ft. with double towers (Byzantine) is one of the most capacious: the interior was burnt 1865. Among the others may be named: First Presbyterian church (Gothic) of reddish brown stone, with large buttresses, 119 ft. by 80 ft., with a tower and spire 160 ft. high. Another in Tenth street (Gothic) 116 ft. by 65 ft. with a spire 184 ft. Congregational church in Thirty-fourth street (Gothic), with elaborate ornamentation. Dutch Reformed church (Gothic), before 1818, by — Le Fevre. Unitarian church of the Messiah, 1853 (Lombardic), by J. W. Mould, of stone from Normandy and of brick, 100 ft. by 74 ft., the detached campanile is 24 ft. square and 227 ft. high (*BUILDER Journal*, xi, 705). S. Paul's Methodist Episcopal church (Romanesque) of white freestone, 146 ft. by 77 ft.; the spire 210 ft. high. The Roman Catholic cathedral of S. Patrick (Gothic), first stone laid 15th April 1858, is by James Renwick, jun.; it is 328 ft. long by 175 ft. wide, and was intended to cost £170,000, and to surpass that at Montreal (*BUILDING NEWS Journal*, iv, 886); its size is noticed in *BUILDER Journal*, 1859, xvii, 118, as being 20 ft. wider and 30 ft. higher than York minster; the nave, 3 ft. wider and nearly 40 ft. higher than that of S. Paul's, London. It was partly burnt Oct. 1866. The two western towers and spires are 328 ft. high.

The city hall, in the Park, 1803-12, of three Italian orders, has three sides of white marble, the rear of freestone; it is 216 feet long by 105 feet wide, 60 feet high, cost about half a million of dollars; and is one of the best architectural works in the State. It contains numerous public offices, and several fine halls, as the governor's, the common council room, etc. Here is the fire bell, weighing 6910 lbs. The new court house (Corinthian), of white marble, is three stories high, 250 ft. by 150 ft.: the law courts adjoin; the dome is 225 ft. high. The Rotunda 1818 by Vanderlyn for a panorama, 53 ft. diam. and 40 ft. high, is now used by the Croton water commissioners. The custom house, formerly the merchants' exchange, rebuilt after the fire of 16th Dec. 1835, a fireproof structure of Quincy granite, by Isaiah Rogers, is 200 ft. long, 171 ft. to 144 ft. wide, 77 ft. high to the top of the cornice, and 124 ft. to the top of the dome. In front is a recessed portico of eighteen Ionic columns, twelve in front, each of a single block 4½ ft. diam. and 38 ft. high, and weighing 43 tons; among the numerous rooms is the rotunda 80 ft. diam., over which is the dome supported in part by eight Corinthian columns of Italian marble; (*ILLUSTRATED LONDON NEWS*, viii, 409). The Corn exchange is a noble brick building. Manhattan market (Lombardian) is 800 ft. by 200 ft. The United States treasury and assay office, formerly the custom house (Greek Doric) designed by I. Town and A. J. Davis, was built 1833-41 (on the site of the Federal hall, built 1789 by L'ENFANT); it was "improved" 1835 by W. Ross, as described in *LONDON, Arch. Mag.*, ii, 325: John Frazee is also named as the architect: a plan and elevation are in the library of the Royal Inst. of Brit. Archts. It is of white marble and fireproof, 280 ft. long, 90 ft. wide, and 80 ft. high, with eight Doric columns in front, each 5 ft. 8 in. diam., standing above eighteen marble steps. The rotunda is 60 ft. diam., the dome being partly supported by sixteen Corinthian columns 30 ft. high. City prison or Tombs (Egyptian), 253 ft. by 200 ft., by J. Haviland (nine sheets of drawings of it are in the library of Roy. Inst. of Brit. Architects), is of a light coloured granite, has a portico of massive columns, and has 148 cells. City penitentiary on Blackwell's island, is a large stone building four stories high, consisting of a centre surmounted by a square tower, and of two wings: near it are the lunatic asylum, almshouse, and workhouse. New York hospital, chartered 1771 has three large buildings, respectively 124 ft. by 86 ft., 128 ft. by 90 ft., and 93 ft. by 63 ft., each four stories high. Lunatic asylum at Bloomingdale, 1821, having 40 acres of land. Deaf and dumb asylum 1817 is the largest of the kind in the country; it covers 37 acres of ground. Institution for the blind for 200 inmates, is 175 ft. long, and six stories high. Idiot asylum 1855 is at Syracuse (*CIVIL ENGINEER*, etc. *Journal*, xviii, 329). Lenox hospital; and the Lenox library (modern French), 192 ft. long, 114 ft. wide, and 101 ft. high. Mount Sinai hospital. New state arsenal, 1858-60, by Cleveland and Backus (*BUILDER Journal*, xvi, 840; xvii, 344; xviii, 60; illustrated in *AMERICAN ARCHITECTS' Journal*, 1859). New post office and United States court building, 1869-75 (French Renaissance), was built "under the superintendence of five experienced architects", at a cost of nearly 4,000,000 dollars; it is of Dix island granite, the fronts are 290 ft., 340 ft., 320 ft., and 130 ft. The American MANUFACTURER and *BUILDER Journal* for April 1871; also *BUILDING NEWS Journal*, 1869, xvi, 226.

Columbia college, founded as King's college, by charter of George II, in 1754, has about 170 students, and a library of 17,000 volumes. The college of physicians and surgeons was founded 1791, has 193 students, and a good library. The university, incorporated 1831 (English collegiate style), of marble, 180 ft. by 100 ft., and four stories high, has a chapel lighted by a window of stained glass, 24 ft. wide and 50 ft. high; there are about 350 pupils. Free academy (14th century Gothic), opened 1849, 125 ft. long, by J. Renwick, cost

£14,000 (DUBLIN BUILDER *Journal*, 1859, i, 11). New Normal college, very complete, 300 ft. long, with a main hall seating 1600 students. Institute of Fine Arts, 1890, contains the Düsseldorf collection: its gallery, by J. R. Hamilton, cost £12,000; it is 200 ft. long by 34 ft. wide. National academy of design, with exhibition galleries on the third floor (designed after the doge's palace at Venice). Lyceum of Natural History, 1836, by W. Ross. Cooper Institute, of six stories, is 195 ft., 143 ft., 155 ft., and 86 ft. long, in respective fronts; two lecture rooms are each 125 ft. by 82 ft. by 21 ft. high. Astor library (Byzantine), 1851-54, by Saeltzer, had over 150,000 vols. in 1875 (BUILDER *Journal*, ix, 722, 799; xii, 248; CIVIL ENGINEER, etc. *Journal*, xiv, 596). The Harper Street bookselling establishment was rebuilt after the fire of 10th Dec. 1853 (BUILDER *Journal*, xiii, 455; xvi, 470).

The bank of New York, by C. Vaux and — Withers, (BUILDER *Journal*, 1858, xvi, 126): Drexel's bank, etc., 202 ft. by 75 ft. inside; Henry Clews and Co.'s bank; Western Union telegraph office; New York Life Insurance Co.'s office of white marble, and others; New York Herald office, on site of Barnum's museum burnt 1865; New York Tribune office 1874; A. T. Stewart's dry goods store is probably the largest establishment of the kind in the world; it is eight floors high. The Masonic temple (Italian), is of granite, and very complete in its arrangements.

The Grand Opera house (Pike's) with a front of 173 ft.; Booth's theatre, probably the most magnificent place of amusement in America, of Concord granite, 149 ft. frontage, and seating about 3000 persons; and the Bowery theatre, are among the best buildings of this class. The crystal palace of iron and glass, 1852-53, by Carstensen and Gildemeister, was an octagon surmounted by a Greek cross, with a dome at the crossing. It was 365 ft. each way, 143 ft. high to top of the lantern, and it covered 111,000 square feet; with an additional 62,000 square feet in the galleries. ILLUSTRATED LONDON NEWS, xxii and xxiii; BUILDER *Journal*, x, 612; and views 674.

The suburb of Brooklyn is reached by ferries across the East river, but a suspension bridge of about two-fifths of a mile long, is (1875) in course of formation. Greenwood cemetery is considered as "the most beautiful 'city of the dead' in the world." Prospect park is 510 acres in extent, and commenced to be laid out in 1866; the land cost about four million dollars, and the works will cost about five millions more. The navy yard is situated at Brooklyn. The city hall (Italian-Ionic) 1846-49, of white marble, 182 ft. in front, is by G. King; its dome is 153 ft. high (BUILDER *Journal*, ix, 549); the academy of music, and other public buildings, are near it.

A plan, 1695, by J. Miller, *Guide*, 1866. Map No. 194, of the Society for Diffusion of Useful Knowledge, 1847. BRODHEAD, *History of the State*, 8vo., N. Y., 1853. HINTON, *Hist. and Topog. of United States*, 4to., Lond., 1830-32. *Picture of New York*, 12mo., Lond., 1846, with map. SPOFFORD, *Pocket Guide*, 8vo., 1824. HARDIE, *Description of the City*, 12mo., New York, 1827. RIPLEY and DANA, *New Amer. Cycl.*, 8vo., New York, 1861. STRICKLAND, *Public Works of the United States*, fol., 1841. APPLETON'S *New York Illustrated*, 8vo., 1875, with plan. *Englishman's Illustrated Guide Book to the United States and Canada*, 2nd ed., 1875. 14. 50.

The *Englishwoman in America* gives a description of a private house in the city: a good article in *Scribner's Monthly Journal* for 1873 or 1874 is also well illustrated. *Critical View of the architecture of New York in 1838*, in LONDON, *Arch. Mag.*, v, 641. *Notes on American Architecture and Engineering*, in ARCHITECT *Journal*, 1850, ii, 88, 111. *New Buildings and their Architects*, in BUILDING NEWS *Journal*, 1859, v, 461; 1860, vi, 228; and *Iron Fronts*, 1869, xvi, 31: the first one is engraved in ILLUSTRATED LONDON NEWS, 1851, xviii, 280, and BUILDER *Journal*, 1869, xxvii, 529. *Materials obtained*, in ARCHITECT *Journal*, 1870, iii, 99. Fifty-four sheets

of photographs of modern ecclesiastical and domestic buildings in New York and United States are in the library of the Royal Inst. of Brit. Archts. The ALLGEMEINE BAUZEITUNG, pl. 18-28, 1846, gives a general plan of the city, with details of the construction of the warehouses and dwellings.

NEXARIS. An architect, the age and country of whom are uncertain; he wrote upon the proportions of architecture, as noticed in VITRUVIUS, vii, pref.

NICÆA (*Nikaia*). An ancient ruined city in Bithynia, in Asia Minor, marked by the Turkish village of Is-nik, which is in the middle of the ruins. It was built or restored by Antigonus (333-301 B.C.), son of Philip, after whom it was called Antigoneia; and later Nicæa. The city early became the seat of a bishop; it was restored after an earthquake, by the emperor Valens in 368: from 1204 until 1261 it was the Greek capital; the Turks again became its possessors in 1333, after an obstinate siege; and it was pillaged 1402 by the followers of Tamerlane.

The town was built in the form of a square. The site of it is stated by FELLOWS, *Asia Minor*, 8vo., 1839, p. 110; 1852, p. 82, to be walled for a circuit of four miles. One part is built or repaired with ancient materials of great elegance; another portion is built with Roman bricks; a third with marbles of a late age, showing repairs made in Christian times; the remaining parts are built of immense stones cut to fit each other. Four large gateways with arched entrances exist in an almost perfect state; also ancient bas-reliefs, inscriptions, and statues; and the ruins of an early Greek theatre, of good workmanship, the stones being colossal, some 9 and others 14 ft. in length. Ruins of mosques, baths, and houses are to be seen; and in the village of Is-nik is a small church used by the Greeks, with a mosaic floor and ceiling of the Byzantine age. A Roman aqueduct is still in use, and in the lake Ascania are the remains of an ancient landing place. TEXIER, *Asie Mineure*, fol., Paris, 1839-49, i, pl. 5-14, gives a plan of the town, and the "green mosque". LEAKE, *Asia Minor*, 8vo., Lond., 1824, p. 10. WALPOLE, *Travels*, 1817, p. 200. E. J. DAVIS, *Anatolia*, 1875, DALY, *Revue Générale*, iii, 49. DONALDSON, *Arch. Numismatica*, 8vo., Lond., 1859, gives the representation in p. 70, 71, and 87 of two buildings in the city, and the circuit of the city walls with the entrance gates and towers; and he remarks, p. 266, "that there is hardly any town of antiquity out of Rome which offers so many medals illustrating various edifices". 14. 23.

NICCOLO DA PISA; see PISA (N. DA).

NICHE (It. *nicchio*, a shell; Span. *nicho*; Fr. *niche*; Ger. *niche*). A recess in a wall to receive a statue or work of art. In mediæval architecture, such recesses were called measons, habitacles, hovels, housings, and tabernacles, which latter term is applied by Luigi Jones to the decoration of the niches of Roman works, as in LEONI, *Palladio*, fol., 1742, ii, 47, 50. The niche seems to have been scarcely known to the Greeks, an example, however, may be seen at Messene, as in STUART, *Antiq.*, folio, London, 1830, iv, 21, pl. 1. VITRUVIUS, in his *Treatise*, does not write about niches; but in an inscription found at Gabium, and published by VISCONTI, the niche appears to have been known to the ancients by the term *zotheca*. The temples at Baalbec offer numerous examples of the use of this important feature in monumental architecture; and another in the monument of Philopappus, in STUART, iii, pl. 97.

Hardly anything than a niche could have been better devised for the reception and exhibition of works of art in combination with architecture; the object being framed in, and thrown into strong relief by shadow—a very important consideration. Niches must be contrived to set off the objects they are to contain to the best advantage; and therefore no ornaments should ever be introduced within them, as is sometimes injudiciously practised; for they would serve to confuse the outline of the statue or group. It is even wrong to continue an impost

within the niche. An excess of ornaments round the niche should likewise be avoided, and particularly any representations, which may serve to divert the eye from the principal object. Niches may be either round, pointed, or square-headed, and may be of any form or plan. As a niche is intended to receive *something*, it is a solecism to leave it empty. The *depth* should always be sufficient to contain the whole work placed in it, it being very disagreeable to see any weighty object with false bearings, and supported on consoles or other projections, as is sometimes done; when in the case of a niche, the side views become exceedingly uncouth; for in these a leg, an arm, a head, in short those parts alone which project beyond the niche, appear and look like so many fragments stuck irregularly in the wall.

When, as is sometimes done in rooms, a large niche or rather niche-like recess, is carried down to the floor, its head may properly enough be coffered or otherwise enriched. Niches are sometimes made alternately square and round-headed; or a central niche is distinguished from those on each side of it, by being carried up higher, as is done in the statue gallery at Holkham. In vestibules, staircases, dining-rooms, or perhaps libraries, where the walls are neither hung nor papered, niches give decided architectural expression. Space for a niche may be obtained by cutting off the angles of a room, as in a dining room, where such treatment of the angles would detract nothing from commodiousness, but would obviate the monotonous effect of the rectangles.

The size of the statue depends upon the dimensions of the niche; it should neither be so large as to seem rammed into it, nor so small as to seem lost in it. PALLADIO, in an arched niche, makes the chin of the statue on a level with the top of the impost, so that the whole head is in the covered part. The distance between the outline of the statue and the sides of the niche should not be less than one-third of a head, nor more than one-half, whether the niche be square or arched; and when it is square, the distance from the top of the head to the soffit of the niche should not exceed the distance left on the sides. Sometimes where the niches are very large in proportion to the architecture they accompany, the statues may be raised on small pedestals, by which means they may be made lower than usual, and yet fill the niche sufficiently, in order that statues of a proper size to fill such large niches should not make the columns and entablatures appear trifling.

LEEDS, *On Niches and Statues*, in reprint of CHAMBERS, *Decorative Part of Civil Architecture*, printed in BUILDING NEWS JOURNAL, 1861. DUBLIN BUILDER JOURNAL, *Remarks on Niches*, Oct. 1861. MILIZIA, *Biography*, 8vo., Lond., 1826, p. 50. QUATREMÈRE DE QUINCY, *Diet. BAGE; BODY; ANGULAR NICHE; FENESTELLA; HABITACLE; GROUND NICHE; STATUE; TABERNACLE*. 14. 17. 25.

NICHOLSON (GEORGE), architect to the dean and chapter of Durham, rebuilt 1772-7 Prebends bridge, adjoining that city: BRAYLEY, *Beauties*, etc., 8vo., p. 63. HUTCHINSON, *Durham*, ii, 317, gives the date as 1781.

NICHOLSON (JAMES), of Southwark, was 18th Henry VIII (1526) one of the contracting parties for glazing the eighteen windows of the upper story of King's College chapel, Cambridge, including the great east and west windows; BRITTON, *Arch. Antiq.*, i, 16. SCHARF, *Journal of the Archaeological Institute*, 1856, xii, 153, 357; xiii, 44.

NICHOLSON (PETER), born 20th July 1765, in the parish of Prestonkirk, East Lothian, was the son of a stonemason. Disliking his father's trade, he was apprenticed to a cabinet-maker at Linton, then worked at Edinburgh, and at twenty-four years of age proceeded to London, working at his business and teaching in a school; his success enabled him to engrave the plates for his first publication, *The Carpenter's Guide*, 4to., 1792, which contains an original method of constructing groins and niches of complex forms. This was followed by other works. He returned 1800 to his native village;

went to Glasgow, where he practised as an architect until 1808, erecting a timber bridge over the river Clyde; Carlton Place; a house for Fulton Alexander, esq., at Partick; three houses in the city; additions to the college buildings; coffee room at Paisley; and laid out the town of Ardrossan, in Ayrshire, for the earl of Eglinton; the harbour was by T. Telford, on whose recommendation, Nicholson on his removal to Carlisle was appointed architect to the county of Cumberland, and superintended the new court-houses by R. Smirke; he also designed Corby castle, for Henry Howard, esq., and Castleton house for Robert Mouncey, esq., both near Carlisle. In 1810 he returned to London, where he produced *The Architectural Dictionary*, 2 vols., 4to., 1812-19, giving plates of many of the above designs, under House, Town, University, etc.; and published other works relating to the art of building, and others on various sciences. From the Society of Arts, etc., he received, April 1814, the gold Isis medal for the invention of the CENTROLINEAD; and for its further improvement, May 1814, the sum of £20, and the silver medal in 1815; with others. He visited France in 1826; and on his return translated some mathematical works; and 1829 went to reside at Morpeth on a small property left to him by a relative; 1832 left for Newcastle-on-Tyne, where he opened a school, and where in June 1834 he received a present of £320, raised by public subscription. He also published *Treatise on Perspective and Isometrical Drawing*, 62 pl., 8vo., 1837, which contains a portrait of him by Edward Train; also *The Guide to Railway Masonry, being a Treatise on the Oblique Arch*, 8vo., Jan. 1839, 59 pl.; which was the last of his works, exclusive of contributions to Brewster's *Edinburgh Encyclopædia*, Rees' *Encyclopædia*, etc. He was very able as a practical mathematician; and several of his publications went through many editions; the *Dictionary* was re-edited in 1852-4.

Nicholson died at Carlisle, 18th June 1844, aged 79 years, and was buried in Christ church. A bust of him, by R. S. Scott of Newcastle, was presented to the Mechanics' Institute in that town. The MECHANICS' MAGAZINE, iv, 1825, has another portrait, with the memoir published in *The Builders' etc., New Director*, which gave a portrait by Heaphy, engraved by Armstrong. The BUILDING CHRONICLE JOURNAL, 4to., Edinburgh, 1855, gives an etching, by R. W. Billings, of a monument to him to be erected at Carlisle.

Besides the memoir above noticed, an excellent one, signed "O. T.", is given in CIVIL ENGINEER AND ARCHITECT'S JOURNAL, 1844, vii, 425-8 (also 297), which states that the whole of Nicholson's active and scientific labours were directed towards applying science to useful purposes: it reviews his publications, and notices that he was the first author to write on hinges for doors; to publish plans of roofs as executed, as in the *Joiner's Assistant*; also the first who discovered that Grecian mouldings were the sections of a cone; and other valuable inventions. His remark that he would defy any person to prove that he ever derived any information from foreign works, is also recorded; and it concludes with a list of his publications, twenty-four in number. The part relating to Plastering, in his *Practical Masonry*, was written by R. Robson, as stated in BUILDER JOURNAL, 1846, iv, 514. *Recollections of P. N.*, by R. Brown, in BUILDER JOURNAL, 1849, vii, 615; and another notice, 1855, xiii, 611.

MICHAEL ANGELO was a son of PETER by his first wife. He published with his father *The Practical Cabinet Maker*, 4to., 1826; and for himself *The Carpenter and Joiner's Companion*, 8vo., 1826, in which is a portrait of his father, from a painting by — Derby. He was an architectural draughtsman; 1826 lithographed the plates for Inwood's *Erechtheion*; and 1834 published large sized etchings of *The Five Orders*. He died in 1842, leaving a numerous family. PETER, another son by a second wife, had a son JAMIESON T., who in 1844 was employed on the Lancaster and Carlisle railway under Mr. Errington.

NICHOLSON (WILLIAM ADAMS), born 8th August, 1803, at Southwell, in Nottinghamshire, was the son of a carpenter of that place. He was articled 1821-4 to John B. Papworth of London, and settled in Lincoln in 1828, in which and the neighbouring counties he had an extensive practice. He designed the churches at Glandford Bridge, at Wragby, and at Kirmond, on the estate of C. Turnor, esq.; effected restorations of many others, including that of S. Peter at Gowts, in Lincoln, not completed at his death: designed Worsborough Hall, Yorkshire; Bayon's Manor castle, the seat of the Rt. Hon. C. T. D'Eyncourt; and Elkington hall, near Louth, etc., and the town hall at Mansfield. The estates of general Reeve; Sir J. Wyldbore Smith, bart.; Mr. C. Turnor; Mr. C. Chaplin; among others, evince his skill in farm buildings; and the village of Blankney was almost rebuilt under his superintendence. Besides many edifices in Lincoln, he designed the Wesley chapel 1837 for 2000 persons, with a wide span roof; 1837 the union workhouse; 1847 the corn exchange, since enlarged; a corn mill; and several private houses. He died suddenly at Boston, 8th April 1853, and was buried in S. Swithin's churchyard in Lincoln. *Builder Journal*, xi, 262.

He was a member of the Lincolnshire Literary Society; of the Lincolnshire Topographical Society, whose *Selection of Papers*, 1841-42, 4to., Lincoln, 1843, contain his *Advantage of recording the discovery of local antiquities*, p. 87, and *Tattershall Castle*, p. 91; and was also a fellow of the Institute of British Architects; its *Transactions*, 4to., Lond., 1842, i, pt. 2, 180, contain his *Report on the Construction of the Stone Arch between the west towers of Lincoln Cathedral*, with carefully measured illustrations.

NICKEL. A metal first described by Cronstedt in 1751, which is highly magnetic, acquiring polarity even by the touch. It is of a white colour with a yellowish tinge; of considerable lustre, and both malleable and ductile. Mixed with copper and zinc, it forms German silver and British plate. It combines with other metals, with oxygen, and the other electro-positive elements, with acids, and with some other substances. It frequently contains a little arsenic; and is scarcely tarnished by exposure to the air or to heat at common temperatures. Its oxides impart a green colour to glass and porcelain. It has been asserted that nickel mixed with iron in certain proportions would prevent rust, and prove superior to painting or galvanising. Nitric acid is the only acid which readily acts upon it. 14.

NICKEL (meister CLAUS), of Berlin, built 1521 the western part of the *Marienkirche*, which had been burnt. 92.

NICKING OUT. When a long line for a roadway or such like purpose has been carefully laid out and stakes driven in along it, it becomes necessary to cut a channel very carefully along the entire length; this is termed "nicking out". This channel is made about 9 or 10 in. wide, and is formed by a triangular sod being cut out and thrown aside; when the centre line of a railway is laid out, as explained in HASKOLL, *Railway Guide*, 8vo., Lond., 1848, i, 83.

NICOLAASZ (PAULUS), of the province of Gelderland, 1440-51, with Gysbert Philips, pulled down and rebuilt the tower of the church at Tiel, built by Theodoricus, the foundations having given way. 24.

NICOLAS. One of the masters of the works 1360-62 at the cathedral at Sens, when important repairs were made to the roofs. In 1377 he received a pension of 10 livres. *QUANTIN, Not. Hist.*

NICOLAS. Between 1495 and 1521 many French architects worked in Portugal. He built the church of S. Cross at Coimbra, with Jean de Rouen, Jacques Longuin, and Philippe Edouard. In 1517 he raised the portal of the church at Belem; and executed the sculpture of the altar in the chapel of the convent of Notre Dame de la Peña, near Cintra; also the scenes of the Passion in the same chapel. RACZINSKI, *Dict. Artist. de Portugal*.

NICOLAS, a Benedictine, built 1710 the portal of the church of S. Francis at Rouen. *LANCE, Dict.*, 1872.

NICOLAUS, *steinmetz*, see ESELLER (N.).

NICOLE or NICOLLE (NICOLAS), born 1701 at Besançon, was apprenticed as a worker in iron, went to Paris and studied under Blondel. On his return he constructed the church of Refuge; designed the collegiate church of S. Anne at Soleure, residing there to direct the works; and in 1746 constructed the church of the Madeleine, at Besançon, which has not been completed; and where he died 22nd January 1784. *Droz, Recherches Hist. sur la ville de B.*

NICOLEIA, see NACOLEIA.

NICOLLE *P. Anglois*, a burgher of Caen, in Normandy, and treasurer of the church, is stated by DAWSON TURNER to have directed the erection 1308 of the tower and spire of the church of S. Peter, at Caen; *BRITTON, Normandy*, 17.

NICOLO DA MODENA or N. ABATI; see MODENA (N. DA).

NICOLO DA PISA; see Pisa (N. DA).

NICOLO of Florence, called il TRIBOLO; see BRACCINI (N.).

NICOMEDEIA. The capital of Bithynia, now represented by ISMID, ISNIKIMID, or IZMID, in Asiatic Turkey. It was founded by Nicomedes I, B.C. 264; Diocletian chiefly resided there (A.D. 234, resigned 305), when it increased greatly in extent, and became inferior only to Rome, Alexandria, and Antioch in extent and populousness. It was almost entirely destroyed by an earthquake in the time of Julian (361-3), but it was again rebuilt by Justinian with great splendour, and recovered nearly its former greatness. There are now few remains of antiquity; some walls of the acropolis of Hellenic work support Byzantine towers, of which period is the cistern of Imebaker, given in *TEXIER, Asie Mineure*, fol., Paris, 1839-49, i, pl. 1-3, which also has a view and a tombstone. GIBSON, *Decline*, 8vo., Lond., 1853, i, 59, 452; ii, 151, 266. DALLAWAY, *Constantinople*, 4to., Lond., 1797, p. 157. POCOCKE, *Travels*, iii, 143, etc. DAVIS, *Anatolia*, 1875. The present town of Ismid is of considerable importance. 14. 23. 28.

NICOMEDES of Thessaly, is noticed also as an engineer to Mithridates the great, king of Pontus (about B.C. 131-63). Another NICOMEDES, *cir.* 300 B.C., is the reputed inventor of the conchoid. 5. 59.

NICON or NICO of Pergamus, also a geometrician, was the father of Galen, who also knew something of architecture. NICO lived in the beginning of the second century after Christ. MILIZIA states he died A.D. 161; and that his father and grandfather were also of the profession. *SUIDAS, s.v. Γαληνός*. 29. 59.

NICOPOLIS. A city of Epirus, erected by Augustus in commemoration of the victory of Actium, B.C. 31. On the site of his tent, he erected an hypæthral temple to Neptune (or Apollo), *DION CASS.*, ii, 12. The city had fallen into decay in the time of Julian (361-3) who restored it and the games. It was plundered by the Goths early in the fifth century, and restored by Justinian, and was still the capital of Epirus in the sixth century. The town of Prêvesa, three miles to the south, took its place in the Middle ages. There are still very considerable remains, now called Palaioprêvesa, consisting of arched buildings of brick, probably sepulchres; remains of a strong wall; the castle, an irregular pentagonal enclosure, surrounded with walls having square towers, about 25 ft. high; the walls on the western side are almost perfect, all perhaps the work of Justinian: remains of a small theatre, 200 ft. diam. (LEAKE), or 60 ft. (WOLFE): the ruins of a quadrangular brick building, perhaps a palace; and part of an aqueduct, which was formed on the city walls: a plan of the reservoir, etc., by T. L. Donaldson, is given in LEAKE; the aqueduct was thirty miles long, and considerable remains are observed in parts of Epirus: *Detached Essays*, Aqueduct, p. 6. Further north are the remains of a great theatre, being "one of the best preserved Roman theatres in existence"; it is about

300 ft. diam.; the scene is 120 ft. long by 30 ft. deep (116 by 28, HUGHES); and there are twenty-seven rows of seats in three divisions. ECHEUM. Close by are the ruins of the stadium, which was circular at both ends, unlike all the other stadia of Greece, but similar to several in Asia Minor, which have been constructed or repaired by the Romans. Near are the ruins probably of the gymnasium. LEAKE, *Northern Greece*, 1835, i, 185; and *Asia Minor*, 329. WOLFE, in *Geographical Society Journal*, iii, 92. HUGHES, *Travels*, 1830, i, 411-25, gives a plan.

NICOPOLIS also called JULIOPOLIS, near Alexandria; see *Detached Essays*, Aqueduct, p. 2.

NICOPOLIS, see NIKOPOL, in European Turkey.

NIDGED WORK, see NIGGED.

NIESENBERGER (HANS) of Graetz, built 1471-1513 the choir of the munster at Freiburg in Bresgau; SCHREIBER, *Das Munster*, fol., Carlsruhe, 1826, p. 8, calls him Riesenberger. The interesting agreement with the burgermeister is translated and given in *Builder Journal*, 1850, viii, 183. 92.

NIESNA, see NIJNI NOVGOROD, in Russia.

NIUWENHUIZEN (JOHAN) born 1768 at the Hague, was a pupil of J. Bergman, whom he greatly assisted in his works also of sculpture. In 1817 he rebuilt one of the club houses, and designed a summer house in the wood for its members. He also designed two noblemen's houses, and several other works. He died February 1848.

NIGETTI (MATTEO). The date of whose birth is unknown, was the son of Dionigi, a carpenter; he became a pupil of B. Buontalenti, and worked at Florence, where he was 1592 greatly concerned in the execution of the Strozzi palace; and designed 1602 the church of S. Francesco dei Vanchetoni, via del Palazzuolo: and began 1604 the execution of the design by don Giovanni de' Medici for duke Ferdinand I, for the third sacristy to the church of S. Lorenzo, behind the choir, to contain tombs of the Grand dukes of that family. It is nearly 90 ft. across, and comprises a cupola about 190 ft. high; Nigetti made designs for its ornamentation: it is now the cappella de' Principi, and is still incomplete; in 1722 it had cost 18,000,000 lire, and perhaps up to about 1860 may have cost about 22,000,000: it is described in TAPPEN, *Observations*, 8vo., Lond., 1806, p. 94-6. He rebuilt 1604-48 the church of S. Michele e Gaetano, also called S. Michele Bertelde or degl' Antinori of the Theatines, from the design of don Anselmo Cangiano (not of don Gio. de' Medici, as usually stated), and completed by the two Silvani—the façade 1648 was by P. F. Silvani; ZOCCHI, pl. 11; plan in FAMIN, pl. 65. In 1604, he modernised the cappella di S. Benedetto Bianco in the church of Sta. Maria Novella; to which 1629 he added the library. He built 1621 the cloister of the monastery of Sta. Maria degli Angeli; made the design and model of the church of S. Salvatore di Ogni Santi belonging to the Osservanza, it was rebuilt 1627 by B. Pettrossi, the façade only is by Nigetti; who modernised the palazzo Bardi, now Tempi; executed the door della compagnia di S. Giuseppe, given in RUGGIERI, *Studio d'Archit. Civile*, folio, Florence, 1755, i, pl. 66; modernised SS. Consegione, formerly the convent of S. Onofrio di Fuligno; the outer doors were by M. A. Buonarroti: 1634, added a portico to the church by Michelozzi, in the hospital for pilgrims sent to Jerusalem: 1635, the Doric loggia to the church of S. Domenico, outside the porta a Pinto: and 1651, much altered the chapels of the principal limb of the cross of the church of Sta. Maria Annunziata, continued by the Silvani. As a sculptor, his principal work was the pix or shrine in the chapel of S. Lorenzo. He died 13th December 1649, and was buried in the church della Nunziata.

NIGGED or NIDGED WORK or NIGGING. Granite squared and faced mostly by a cavil or hammer with a sharp pen or point, which reduces the roughness of the stone to a degree of smoothness according to the time employed upon

it. This work is sometimes described as smooth, and fine hammer dressed on the face.

NIGHT BOLT. An upright bolt generally made of brass, fixed to the architrave of a door, with a hinged latch fixed to the door itself, so that by a pull and cranks connected from the bed, any one lying in it can, by raising the bolt, admit persons into the room without getting out of bed.

NIGHT SOIL. The contents of a cesspool in towns was so called, on account of its being generally removed during the night, when all windows are shut. A ton contained 18 cubic ft., and any portion of a ton used to be counted as a whole one. A cart held $2\frac{1}{2}$ tons or 45 cubic feet (1852).

NIJMEGEN (HERMANN, or H. von Nimwegen), *baumeister* at Lubeck 1340-60, is one of only two names found recorded by MILDE and DEECKE, *Denkmäler-Lubeck*, fol., Lubeck, 1843-7.

NIJNI-NOVGOROD, or Lower Novgorod. The capital of the government of the same name in Russia, and founded 1222 or 1227. It is situated on the river Volga, here 4600 ft. wide, at its junction with the Oka, over which is a bridge of boats. The old town of timber was burnt 1767, and rebuilt of stone by the sovereign of Russia. The old or high town occupies the slope of a steep triangular promontory 400 ft. high; the low town consists of the quays and streets behind, on the bank of the Oka. The krenlin or citadel (pl. 60) is surrounded by a wall built 1508, 30 ft. high, flanked with many towers, round or square; it contains the two cathedrals, one dedicated to the archangel Michael (pl. 61), and the other the *Uspenski sobore* (pl. 62) or Assumption of the Virgin (or the Transfiguration), built in imitation of those at Moscow; also a handsome Protestant church, a seminary, the governor's palaces; Mouraviev's tower, of red brick; and a granite obelisk, 46 ft. high, in honour of Minin and Poscharsky. There are some forty or fifty other stone and timber churches, with domes and steeples, among which that of the Holy Women (pl. 68), and the monastery of the Annunciation (given in pl. 67 of DEMIDOFF), together with some other public edifices deserve notice; the rest of the buildings are of timber construction. The bazaar on the other side of the Oka, designed by general Betancourt a Spanish engineer, for the emperor Alexander, in 1817, for the annual fair, considered second to none in Europe, consists of a whole town of stone magazines surrounded by shops, before an edifice having three rows of columns, which is the palace for the time of the governor of the province. Forty-eight blocks of buildings extend beyond the above magazines, and comprise 2524 shops, over each of which is a small apartment in which the merchant resides. They are all roofed with iron, as are also the coverings of the open galleries which run along the façades; and are well drained. A very broad street passing through the centre of this town terminates in a church built in a noble and rich style. There is beyond also an Armenian church and a mosque. The erection of the warehouses cost 11,000,000 of roubles. The buildings were not completed in 1820. HOPE M. BUTLER JOHNSTONE, *Trip up the Volga*, 8vo., Lond., 1875, describes the fair as consisting of "twelve long rows of streets divided into four equal parts by three transverse streets; there are thus twelve by four, or forty-eight streets, which allowing for about twelve shops to each street, gives a total of 576 shops. The whole is surrounded on three sides by a canal, over which are eight bridges. All beyond the above blocks, and on all sides of it, covering some ten times the area, constitute the outer portions of the fair;—a huge red building is the new cathedral". A view of "Niesna or Nizney Novgorod" is in the King's collection, British Museum. BRENNER, *Excursions*, 8vo., Lond., 1839, ii, 211. COCHRANE, *Russia*, etc., 1824, 2nd edit., i, 96. DEMIDOFF, *Voyage Pittoresque*, fol., Paris, 1848.

NIKOLEIA, see NACOLEIA and NIDGEM.

NIKOPOL (the ancient *Nicopolis ad Istrum*). A town of Thrace, now of Bulgaria, in European Turkey, and situated on

the river Danube, where the Iatrus flows into it. It was erected by Trajan, in memory of his victory in 103 over the Dacians, fully sculptured on the column of that emperor at Rome. It is surrounded by ramparts; has an ancient castle, several fine mosques, and baths; otherwise it is an ill-built town. He then built the celebrated bridge (near the present town of Sozorney), destroyed by Hadrian. Views of both are given in BRATTIN, *Danube*, 4to., Lond., 1844, p. 222-4.

NIKOSIA, properly LEUKOSIA, near the site of the ancient Letra or Leucotra. The capital of the island of Cyprus, and situated on the river Pedias. It was the residence of the kings of the Lusignan dynasty. The walls and bastions give it an air of grandeur; it is now lessened to three miles in circumference. The ancient cathedral of Sta. Sofia "was a magnificent specimen of European (Gothic) architecture"; (WIGLEY, in *BUILDER Journal*, 1863, xxi, 257). It was begun by archbishop Albert, in the reign of Henry I of Lusignan, and completed 1228 under Henry II, king of Cyprus. The edifice is 131 ft. 3 in. wide, and 230 ft. long externally; the court in front is of later date. It has been converted into a mosque, and the tombs of the kings much mutilated. A detailed description of it is given in the *ALLGEMEINE BAUZEITUNG*, and translated in *CIVIL ENGINEER*, etc. *Journal*, 1854, xvii, 353. There are several other churches, some being of the thirteenth century, and some mosques; a spacious bazaar; a *khan* or enclosed court for travellers, and the ancient palace of the governor, on the portal of which is still seen the Venetian lion in stone. 14. 50.

NILOMETER. A building erected 847 in the island of Rhoda opposite to Cairo, for recording the annual rise of the river Nile, namely sixteen cubits. At the bottom of a square well is a basin in which stands a plain or fluted slender octangular shaft, about 20 ft. in height, with a sort of double base, and a Corinthian capital. It is described (from a view by L. MAYER, *Views in Egypt*, fol., Lond., 1801, pl. 1), in *BUILDER Journal*, 1859, xvii, 255; 274. D. Roberts was also enabled to make a drawing of it, and the whole structure was carefully measured by COSTE, *Arch. Arabe*, fol., 1839, in 1817. Another such structure is noticed *s.v.* ELEPHANTINE: WILKINSON, *Topog. of Thebes*, 311-7. HEKEKYAN BEY, *Siriadic Monuments*, Lond., 1863, p. 145. CHAMBERS, *Encyc.*, 1874.

NIMES, see NISMES, in France.

NIMPHI or NINFI, see NYMPHI, near Smyrna.

NIMROUD, the site of the Calah of the Book of GENESIS. It is situated about 18 to 20 miles S.S.E. of Mosul, in Asiatic Turkey, in the angle formed by the river Tigris and the confluence of the Greater Zab. It is considered to have been founded about B.C. 1300 by Shalmaneser I, king of Assyria. Assur-nazir-pal, who ascended the throne B.C. 885, rebuilt Calah; the north-west palace, and the temples near the tower are his work. Shalmaneser II succeeded his father in B.C. 860, and built the centre palace and the base, at least, of the south-east palace. Vulnirari III, his grandson, B.C. 812, built the upper chambers and the temple of Nebo. Tiglath Pileser II, B.C. 745, rebuilt the centre palace. Sargon, B.C. 722, restored the north-west palace; and his grandson, Esarhaddon, B.C. 681, built the south-west palace. Assur-ebil-ili, last king of Assyria, rebuilt the temple of Nebo just before the destruction of the empire. During a considerable part of the above period it was the rival of the city of Nineveh (G. SMITH, 73.)

The ruins of Nimroud comprise a quadrangle of consecutive lofty mounds of about four miles in circumference. These were the scene of Layard's first operations, in January 1846, and his success was immediate and complete. In the early part of the following year he explored almost the entire north-west palace, and opened twenty new chambers. A bull and a lion were successfully removed, and by the middle of May 1847, the excavations were finished. This north-west palace, "the oldest of the buildings hitherto excavated in Assyria,

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though not the largest, more than makes up for this deficiency by the beauty of its sculptures, and the general elegance of its ornaments", FERGUSSON, *Illustrated Handbook*, 1855, i, 165, which gives a plan of it from LAYARD, showing it to be about 330 ft. square. The mound was so much extended after this palace was built, and so covered by subsequent buildings, that it is now impossible to ascertain either its extent or form.

Its walls were composed of unburnt brick lined with sculptured slabs of marble (gypsum), eight inches thick, and seven feet high. The principal existing chamber, at the entrance from the river, is 152 ft. by 30 ft., the man-headed lions at the entrance were each 9 ft. long and high. The palace and its sculptures are also fully described in BONOMI, *Nineveh*, etc., 8vo., Lond., 1852, p. 218-95. In a frieze in it, is a compartment representing a royal kitchen: also a siege of a city situated in a plain, having four rows of battlemented walls, a gate between two towers, folding doors in it, etc. The hall of Nisroch is about 100 ft. long by 25 ft. wide. The hall of Divination, about 90 ft. by 25 ft. wide, placed north and south. The hall of the Oracle, 100 ft. by 20 ft. A large court 130 ft. square; a second hall of Divinities, 90 ft. by 30 ft.; another 65 ft. by 20 ft.; and many others were found, as also a sort of obelisk 6 ft. 6 in. high, 1 ft. 5½ in. at top, and 2 ft. at bottom, of black marble (p. 288), each side divided into rows of sculpture in low-relief. The palaces at Khorsabad and at Nimroud are compared (p. 301-3), surmising the latter to be intermediate in style between Khorsabad and Persepolis, and a list of the sculptures then in the British Museum, are given p. 309-11. *ATHENÆUM Journal*, Nos. 1025, 1027, 1098-99. *ILLUSTRATED LONDON NEWS*, xiv, 213; xvii, 332. SMITH (*Assyrian Discoveries*, 8vo., 1875), commenced his researches here in April 1873.

Layard also excavated a chamber arched with kiln-burnt bricks, but it is not stated whether they were wedge-shaped, or if anything was inserted at the top to keep the bricks apart. Tubular drain pipes were used for removing the rain water from the pavements of the apartments; and under them was a main drain formed of burnt bricks, the upper part covered with slabs and tiles; a thin layer of bitumen was laid under all the slabs and pavements.

At the north-west corner of the mound is the lofty cone, 140 ft. in height, covering the ruins of the great ziggurat or tower of Calah, which was excavated by Layard, and found to be square at the base, faced with hewn stone for a height of 20 ft., and 167 ft. 6 in. each way. In the base is a succession of galleries. (FERGUSSON, *Handbook*, i, 180, gives a restoration of it.)

A great mound called Baasheikha, covers an edifice built by the son of the founder of the first palace at Nimroud (*i.e.*, Shalmanabar or Temenbar II), and a new city at Calah Sherghat; LAYARD, *Nineveh*, 8vo., Lond., 1849, ii, 246.

NINA (ANDREAS UGOLINI), the same as ANDREA DA PISA; see also DOOR.

NINEVEH. A celebrated ancient city, the capital of the Assyrian empire, the ruins of which are situated in the pashalic of Mosul, opposite the town of the same name, in Asiatic Turkey, on the eastern or left bank of the river Tigris. The date of its foundation is 2347 B.C. according to the usual chronology: Shalmaneser, king of Assyria, B.C. 1300 built a palace at Nineveh, made it the seat of his government, repaired the temple of Ishtar (restored in the nineteenth century B.C.), which was added to and restored by Assurdan, 1200 B.C. His son Muttaggil-nusku B.C. 1170 rebuilt the palace; and the next monarch Assur-rislim B.C. 1150 rebuilt the palace and the temple, which latter was rebuilt by Samsi-vul III, B.C. 1080: both were rebuilt by Assurnazir-pal, B.C. 885, and his example was followed by his son, Shalmaneser II B.C. 860. Nineveh is mentioned B.C. 865 in the Book of Jonah. Vulnirari III, B.C. 812, built a new temple

to Nebo and Merodach. Tiglath Pileser II B.C. 745 built a palace at the bend of the river. Sennacherib, B.C. 705, entirely removed the old palace, turned the course of the river Khosr, built on the south-west part the magnificent palace; and on the northern part a palace for his son, with the great walls of the city. Assurbanipal, B.C. 668, restored the various palaces and temples, and built a beautiful palace on the northern part, on the site of one built by Sennacherib. About B.C. 634 the city was besieged by the Medes and Babylonians, and after two years it was taken through a breach of the wall, effected by an overflow of the Tigris; the monarch then made a pile of his valuables in the palace, and setting fire to it, perished himself in the flames (G. SMITH, p. 92). The destruction of the city was completed B.C. 606.

LAYARD considered that the series of mounds of Nimroud, Kouyunjik, Khorsabad, and Karamles, though individually large enough to form single cities, are only the different palaces occupied by sovereigns of successive dynasties within one vast capital, and form very nearly a perfect parallelogram. BONOMI (p. 95) gives a map showing an extension to the Gebel Mekloub hills, which is considered untenable by LAYARD, *Nineveh and Babylon*, p. 640. This plan excludes Nimroud, but retains all the other mounds, even Mosul itself, by an alteration of the line of the river between Yarmujeh and the western angle. Mr. G. SMITH states that "the ruins of Nineveh consist now of a large enclosure surrounded by the ruins



A, Northern gate. B, North palace; and C, South-west palace. D, Village of Nebbi Yunas. E, Burial ground. F, Great gate.

(From G. Smith's *Assyrian Discoveries*, 1875.)

of a magnificent wall, about eight miles in circuit. Through the middle flows the stream of the Khosr. The mounds of the wall are said to be in some places even now nearly 50 ft. high; DIODORUS states they were 100 ft., and the breadth of the wall 50 ft. The west wall is $2\frac{1}{2}$ miles long, the northern about $1\frac{1}{2}$ long, and contains the tower and a gate; the east

wall is $3\frac{1}{4}$ miles long, a double mound in it marks the site of the great gate; the south wall is only half a mile long. FER-rousson appears to agree with this site, following the careful survey of the mounds made in 1820 by RICH.

It was suspected that the mounds opposite Mosul occupied the site of Nineveh, if they did not contain the remains of its ancient structures, but no serious attempt to ascertain the fact occurred until Botta, the French consul at Mosul, commenced operations 1842-3 at KOUYUNJIK immediately opposite Mosul. He removed to KHORSABAD, about 12 miles to the north-east, and was soon rewarded by the discovery of the first Assyrian edifice which had been exposed to the view of man since the fall of the Assyrian empire. Place succeeded him there. Layard commenced Nov. 1845 at NIMROUD, and then went to Kouyunjik, and recommenced operations in 1849.

Layard's excavations and those made by the Turkish government at Nebbi Yunas (the name of the southern mound) showed the existence of palaces; the first, built by Vulnirari, B.C. 812; the next by Sennacherib B.C. 705, who after finishing his great palace at Kouyunjik, built a new one here late in his reign. The third palace was built by Esarhaddon, his son, B.C. 681. The northern part of the Kouyunjik mound (the name of the northern mound), is occupied by the palace of Assurbanipal, and the south-western part by that of Sennacherib. Between the two palaces, on the eastern side, there is a wide space, on which no Assyrian building has yet been found. From that period the subject of Assyrian excavations slumbered for many years, until 1873 when the proprietors of the *Daily Telegraph* newspaper reopened the excavations at Kouyunjik, which were continued 1874-6 by the trustees of the British museum, both under the direction of George Smith.

RICH, *Narrative*, 8vo., Lond., 1818; and *Residence*, 8vo., 1836. BOTTA wrote his discoveries to J. MOHL, who published several of them in the *Journal Asiatique*, and *Lettres de M. Botta*, 8vo., Paris, 1845, an abstract of which appeared in the *Penny Cyclopædia*, Suppl. 1846. BOTTA, *Monument de Ninive, mesuré par Flandin*, 5 vols., 371 pl., fol., Paris, 1849-50; translated by TOBIN, 1850. LAYARD, *Monuments of Nineveh*, 1st and 2nd series, 171 pl., 2 vols., fol., Paris, 1849-53; *Nineveh and its Remains*, etc., 2 vols., 8vo., 1849; *Discoveries in the Ruins of Nineveh and Babylon*, 8vo., Lond., 1853; *A Popular Account of Nineveh*, 8vo., Lond., 1853; and *Nineveh and Babylon*, 8vo., 1867. VAUX, *Nineveh and Persepolis*, 8vo., Lond., 1850-1855. FERGUSSON, *Palaces of Nineveh and Persepolis restored*, 8vo., 1851. ILLUSTRATED LONDON NEWS, 1850, xxix, 502. LOFTUS, *Travels in Chaldea and Susiana*, 8vo., 1856. BOSANQUET, *Fall of Nineveh and reign of Sennacherib chronologically considered*, 8vo., Lond., 1853. POPE, *Nineveh, a review*, etc., 1853. PLACE, *Ninive et Assyrie, avec des essais de restauration*, par F. Thomas, 87 pl., 3 vols., fol., Paris, 1867-70, published by the French Government for presentation only. F. JONES, *Notes on the Topography of Nineveh*, etc., 8vo., Lond., 1855; "Capt. Jones has made the best survey of the ruins" (SMITH). RAWLINSON, *The Five Great Monarchies of the Ancient Eastern World*, 2nd edit., 8vo., Lond., 1871. SOCIETY OF BIBLICAL ARCHEOLOGY, *Transactions*, 1874, iii, 448-55, containing the result of excavations 1874, for the British museum; the previous ones 1873 being recorded in *DAILY TELEGRAPH Newspaper*, and both in G. SMITH, *Assyrian Discoveries*, 8vo., Lond., 1875. MYERS, *Remains of Lost Empires*, 8vo., Lond., 1875, p. 99 and 138.

NINGPO. An important city and seaport of China, situated in the province of Chekeang, on the river Takai, or at the confluence of two streams Kin and Yaou. It is surrounded by a wall six miles in circumference, 25 ft. high, 15 ft. wide at top, and 22 ft. at the base, solidly built, and has six gates, beyond which are the suburbs. The streets are broad and long, and the buildings are of one story, mostly of brick: the shops exceeding those at Canton in splendour. Several works

of architecture are equal to the buildings at Soo-choo (GUTZLAFF, 1838). The most remarkable edifice in the city is an hexagonal brick tower, now a mere ruin, about 150 ft. high, erected according to tradition about A.D. 750. Another structure of some note is the temple of Ma Tsupu, of vast size, dating about 1450. A missionary hospital was opened in 1843. The Roman Catholic cathedral fell "some years" before 1869, supposed from the bricks not having been well burnt. MARTIN, *China*, 8vo., Lond., 1847, ii, 304. NEVINS, *China*, 8vo., New York, 1869, p. 175. 72.

NINOE, now APHRODISIAS in Asia Minor.

NIPPER (Fr. *béquette*). An iron instrument made of various sizes, having two arms working on a centre, similar to pincers, and used for laying hold of any small length of metal, as well as for cutting it by means of, sometimes, a projection on each arm sharpened for the purpose, which meet as the nip-pers close. It is useful in bellhanging, etc.

NISHNEI NOVGOROD; see NIJNI NOVGOROD.

NISMES or NIMES (the Latin NEMAUSUS). The capital of the department of Gard in France, and a town of great antiquity. It has been styled "a second Rome". The line of the Roman walls *cir.* A.D. 14 can easily be traced, and many parts exist in good preservation. The amphitheatre, almost entire, is the most perfect specimen in existence after that at Verona, and is in better preservation than the Coliseum. TEXIER gives its size as 433 ft. 8 in. by 337 ft. 7 in.; FROSSARD, 437 ft. 6 in. by 332 ft. 6 in.; DE CAUMONT, *Cours d'Antiq.*, 8vo., Paris, 1838, iii, 405-317 by 229-142 French ft.; and another account 434 ft. by 340 ft., all on the outside, and 70 ft. high. There are two stories pierced with sixty arches, with an attic; in it are thirty-two rows of seats, calculated to hold nearly 17,000 persons: PELET, *Handbook*. The *tour magne* is now supposed to have been the mausoleum of a Greek family. FROSSARD gives the size as about 65 ft. 6 in. diam. in its widest part, and 111 ft. high. The seven-sided basement, said to be 262 ft. in circumference, of brick, was added to the original structure; the upper and octagonal part 115 ft. circum., and 125 ft. high, is built of squared stones, each front having had Tuscan or Doric pilasters of freestone, with an attic over. There is a similar work at Aix. The *maison carrée*, a highly enriched temple, now considered to have been consecrated to Marcus Aurelius and Lucius Verus, is at present a museum of antiquities. It is 40 ft. 3 in. wide, and 82 ft. 6 in. long (CRESY, *Encyc.*, says 43 ft. 8 in. wide, and as high to the apex of the pediment, whence it derives its name), and surrounded by thirty Corinthian fluted columns, having six in front and rear, those at the back and eight on each flank being half encased in the walls. Excavations made between 1822-33 proved this structure to have been the centre of an extensive edifice or series of edifices supposed to have been connected with the forum; a restoration by W. B. Clarke is given in PENNY CYCLOPEDIA, 1840. This temple is said to be accurately reproduced at Stowe in Buckinghamshire; and was also measured for imitation at Richmond in Virginia, U.S. The ruins of an ancient edifice called the temple of Diana, the finest of all the remains, and supposed to have been a Nymphæum, are of moderate size, built of large stones without cement; the interior shows the remains of a vaulted roof with columns and niches; it is probably part of the thermæ, as the aqueduct ran to it; and also to a fountain now in the public gardens. There are also the remains of thermæ; and of a circus or theatre. A good account of the Roman works is given in ARCHITECT Journal, 1871, v, 34-5. Nismes also possesses a vast number of inscriptions, and some mosaic pavements. About 18 miles (3 leagues) distant is the celebrated bridge called the *pont du Gard*, being a portion of the Roman aqueduct which brought water from a distance of 21 miles into a castellum discovered about 1846, in the rue de la Lampèze, at Nismes. It is described in *Detached Essays*, Aqueduct, p. 14, pl. 2, figs. 13, 17, 18,

with a cut of the conduit or channel. The aqueduct is supposed to have been broken up by the barbarians about 406, at which time the water might have been running for about four centuries. In 1745 a carriage way was formed on the side of it, at the level of the middle story, and repairs executed to ensure its stability. INST. OF CIVIL ENGINEERS, *Proceedings*, xiv, 236. ENGINEER Journal, for 18th Nov. 1875. NODIER and TAYLOR also give a plate of the pont d'Ambrussum, near Galliargue. Two Roman gates, one called *porte d'Auguste*, founded in the reign of that emperor, consisting of two large arches and one small one on each side, was discovered 1791, on the demolition of some ramparts of the 12th century. The other, called *porte de France*, consists of a single arch flanked by two circular towers.

The cathedral, dedicated to the Virgin, has a tower of the eleventh century, and a curious frieze; the remainder of the edifice, including the baptistery, is modern. S. Paul (Byzantine), 1838-46, is by C. Questel; DALY, *Revue Générale*, 1851, ix, p. 217 and pl. 18-22, give the fittings; GOURLIER, *Choix d'édifices*, fol. The college church (Palladian) is handsome. S. Charles is bald, and S. Baudile rather majestic. Le grand temple and le petit temple are both Protestant; there is also a synagogue. RENNIE, at the Inst. of Civil Engineers, 5th March, 1844 (CIVIL ENGINEER, etc. Journal, vii, 247), mentions a stone beam in the church of the Jesuits, the rise of which forms the segment of an arch of 565 ft. radius. GERMAIN, *Eglises de Nîmes*, 8vo., Paris, 1838.

Of the other public buildings, the *palais de Justice* (Greek Doric) dates 1826; the hospital 1686, was reconstructed 1811 by Durand; the theatre is by Meunier; le dépôt de Mendicité, in a fortress built for Louis XIV; the hôtel dieu, founded 1313, was nearly entirely rebuilt 1830; and the maison centrale, begun as a fortress, the first stone laid 15th May, 1687, was finished 1688, by Jean Papo, architecte du roi. The three railway stations are handsome; that to Montpellier is 328 ft. long, and has two waiting-rooms holding 1500 persons. A fountain on the esplanade, completed June 1851, was designed by Questel, the sculptures are by Pradier; the total cost was £8,800; the diameter of the large basin is 38 ft. It is engraved in BUILDER Journal, 1852, x, 787; from DALY, *Revue Générale*, 1851, ix, 352, pl. 34-6. Opposite the cathedral at Nismes is a house of the twelfth century with sculptures, in fair preservation; and at S. Gilles, near the town, is another, of the greatest interest: it is now the presbytery.

ALBENAS, *Antiquité de N.*, fol., 1560; 1566. CLERISSEAU and LE GRAND, *Antiquités*, fol., Paris, 1778; 1804. POWNALL, *Notices of Antiq.*, etc., 4to., Lond., 1787, p. 117-46. VEDASI, *L'histoire abrégée de la ville de N.*, Amst., 1767. BEAUMONT, *Maritime Alps*, 1795, plate shows the towers at the entrance of the amphitheatre, perhaps built by Charles Martel. MORGHEN, *Recueil des Antiq. de la ville de N.*, 8 pl., fol., 1788. BONAFoux, *Mon. Antiq.*, obl. fol., 1824. LA BORDE, *Mons. de France*, fol., 1816, pl. 20-23, 29-30, 55-62. DE SHYNES, *Mons. Romains*, fol., 1818. GAILHABAUD, *Mons. Anciens et Mod.*, 4to., Paris, 1812-52, the amphitheatre and temple. CHAPUY, *France Mont.*, pl. 25-38; pont de Gard, pl. 27. A. AURÈS, *Nismes*, 1844. NODIER and TAYLOR, *Languedoc*, fol., Paris, 1833-37, ii, pt. 2, fully illustrates the buildings. FROSSARD, *Tableau—de Nîmes*, etc., 8vo., Paris, 1846, 2nd edit. FERROT, *Lettres sur Nîmes et le midi de la France*, 8vo., N., 1840. MÉNARD, *Hist. Civile—de la ville*, 8vo., 1826; 1875. 14. 25. 50. 107.

NITARD (JEAN). In 1487 Collard Noël having completed the reconstruction of the south transept of the collegiate church at S. Quentin, the works were inspected by three architects, one of whom was Nitard, who considered them well done and without fault; GOMART, *Eglises de S. Quentin*.

NITRATE. A compound or salt, formed by the combination of nitric acid with alkalies, earths, and metallic oxides. Nitrate of lime is nitric acid in combination with lime for a base,

and abounds in the mortar of old buildings. The actions capable of affecting the stability of the composition of ordinary building stones, by reason of the new forms of matter they superinduce, may principally be considered to be those resulting from the absorption of the gases of the atmosphere, and especially the process known by the name of *saltpetring*, or more correctly, of *nitrification*. This process displays itself in the formation of minute crystals, efflorescing from the interior to the exterior of the stone, and leading to the destruction of the exposed surfaces of the latter, through the gradual removal of the minute particles, in consequence of the disintegration produced by the expansive action of the crystals in process of formation. It is supposed that the organic matter diffused through nearly all stratified deposits gives rise to the formation of certain nitrates, such as the nitrate of lime and nitrate of soda, under the influence of damp, of air, and of light of certain descriptions—for nitrification certainly takes place most abundantly near damp ground, rising in a wall *pari passu* with the range of the capillary attraction of its materials, and upon the northern or shaded faces of the said walls. Not only does this nitrification throw off the minute and less adherent particles of the building materials themselves, whether of *stone* or *brick*, but it is also able to detach any projecting coat which may be put upon them, if the adhesion of that coat to the subjacent material should not be of a very energetic nature. Let the adhesion, however, be ever so energetic, if once the action of nitrification should have been established, it must run its course, and the amount of evil it is capable of producing will simply depend upon the quantity of organic matter originally contained in the materials, or susceptible of being absorbed by them from the atmosphere. The secondary limestones which have not been affected by plutonic action, the loamy clays, some kinds of pit sand, sea sand, and some descriptions of natural cements, are particularly exposed to the danger of nitrification in damp situations, rendering it in vain to expect to be able to preserve any mural paintings, or even any sculpture of a delicate character. *G. R. B.

NITRE, the common saltpetre, is the nitrate of potassa of the chemists. It is a compound formed by the union of potassa with aquafortis, now called nitric acid, which itself is a compound of oxygen and azote, hence called nitrogen. Nitre is used in the arts, as in Normanton's hypo-nitro-kali, for removing paint, mentioned in 1862.

NITROGEN. A permanent elastic gas, perfectly transparent, colourless, and free from odour. It possesses all the physical properties of air, but is neither inflammable nor does it support combustion. It seems completely neutral. An ignited inflammable substance plunged into nitrogen gas is immediately extinguished; it is also destructive of animal life. Hence it was originally called *azote*, or destroyer of life; but British chemists have termed it *nitrogen* or generator of nitre. Nitrogen has affinity for hydrogen, oxygen, chlorine, and iodine; most strongly for oxygen. Its specific gravity is generally assumed to be 0.9722, and the weight of 100 cubic inches of it 29.65. But Professor Donovan shows that its true specific gravity is 0.9748, and that therefore 100 cubic inches will weigh 30.0355 grains. Nitrogen is a component of **ATMOSPHERIC AIR**.

NO-AMON, see **AMON-NO**.

NOBBLED-STONE. Stone which has had the rough portions taken off at the quarry, in order to lessen expense of carriage. It is called scaped, skabled, skiffed, rough punched, or fair punched, in local districts. It is opposed to rubble for stucco or roughcast in Devonshire.

NOBILE (PIETRO or PETER VON), was *hofbaurath*, and 1812 one of the four directors of the school of architecture in the academy of arts at Vienna; where he designed about 1805-19 the museum of sculpture, an imitation of the temple to Theseus at Athens; and 1822-24 the *burgthor*, a Doric propylæum, 38 klafters, or about 236 English ft. long, having

five arches: and 1825 the imperial theatre at Graetz; 1830 the church of S. Anthony at Trieste; 1833 the lighthouse on the mole, in the form of a column; and the court chapel (Ionic), consecrated 5th October 1834, for prince Metternich, in his palace at Königswart, near Prague. He died in 1855 or 1856. 26.

NOBIS (FRANÇOIS), was 1468 named master of the works at the cathedral at Sens, succeeding Symonet Lemercier; and was replaced in the same year by Antoine Lusurier. **QUANTIN**, *Not. Hist.*

NOBLE (LOUIS), designed 1624 the hôtel de ville at Troyes, and commenced the works, which were completed 1670, by P. Cottard. **AUFAUVRE**, *Troyes*, etc.

NOBUT KHANEM. The term in Hindostan for the saloon for a band placed at the top of the gateway to the court of a palace. **TOD**, *Rajasthan*, 4to., Lond., 1829, ii, 667. **NAGARA KHANEM**.

NOCERA DEI PAGANI (the ancient **NUCERIA ALFATERNA**). A town in the province of Principato-Citra, in Southern Italy, situated at a short distance from the river Sarno. It consists of detached groups of houses in gardens. It is the see of a bishop, and has a church "built in the style of the Pantheon at Rome", and several others; the large cavalry barracks are by Vanvitelli. The walls and castle of the old town, which was forsaken on account of earthquakes early in the eleventh century, are on the hill above.

About a mile from the new town on the road to La Cava is the round church, dedicated to Sta. Maria Maggiore, dating from the early ages of Christianity. It is 79 ft. in diam., and 47 ft. 6 in. high. A double row of twenty-eight marble columns are disposed in a range 39 ft. diam., around an octagonal basin in the centre of the building, and with arches support a dome in which are a few small windows. A plan and section are given in *Illustrations*, s.v. Baptistery, 1854-55, pt. 1, from **ISABELLE**, *Les Edifices Circulaires*, fol., Paris, 1843; also in **LECLERC**, *Recueil*, fol., Paris, 1826, pl. 99, and in **SAINT NON**, *Voyage Pitt.*, fol., Paris, iii, 1781-6, pl. 170. **CRAYEN**, *Tour*, 4to., Lond., 1821. **LUNADORO**, *Lettera intorno all' Origine di Nocera*, 4to., Naples, 1610. This edifice was restored about 1865. There is a modern church with a good detached bell-tower built near it. 14. 28.

NODUS. The late Latin name for a key-stone or boss in vaulting. It occurs in a Fabric roll of 1437 at Exeter cathedral, where John Budde, peyntor, works on 57 *nodis* in the south ambulatory. 19.

NOEL. An old English term for **NEWEL**.

NOERDLINGEN. A town of Bavaria situated on the rivers Goldbach and Eger. It is surrounded by walls flanked with towers, and is entered by five gates. The cathedral dedicated to S. George, the Virgin, and Mary Magdalen, built 1427-1505, has three equally high and long aisles, the rich vaulting of which is carried by twenty-two pillars. Those employed on this edifice were meister Hans with Hans Felber, *baumeister*, 1427-35; and Conrad Heinzelmann, mason, 1429, all three from Ulm; N. Eseller, mason, 1429, takes the direction 1442-59, and his son Hanitz, *baumeister*, 1455-80; C. Hoeflich and Hans von Salzdorf, both *baumeisters* in 1457; 1464-80 W. Kreglinger of Wurzburg; H. Kugler or Aechser; and S. Weyrer, the latter finished the vaulting 1495-1505. The high altar was by Ulrich Creitz 1511-25. The fine **SACRAMENTHAUS**, a taper stone spire of fretwork, 50 ft. high, is by Weyrer, and the sculptor Creitz. The remarkable west tower is 283 Ger. ft., or 345 Eng. ft. (268 ft. **MURRAY**) high. Of the three other churches, S. Salvator 1381 has only a nave; it was added to in 1401. **BEYSCHLAG**, *Beyträge—Nordl.*, 8vo., Nordl., 1798-1801. 28. 50. 92.

NOG. The same as wood brick. In a brick nogged partition, the *nogging* or *nogging piece* is a piece of wood or a board placed horizontally about three feet distant one from another, between the studs or quarters, to strengthen the

work. **BRICK NOGGING.** Many of the half timber houses in England are built of nogging, the timbers showing on the face of the plastering, which is sometimes formed into ornamental patterns. In Kent they are called "wood noggen houses".

NOIERS (GAUFRIDUS DE). This name was obtained by J. F. DIMOCK from a MS. life of Hugh of Burgundy, in the Bodleian library at Oxford (Digby, 165, fol. 116, b), in which Hugh alludes to de Noiars, as "nobilis fabricæ constructori" of Lincoln cathedral, especially of the chapel of S. John the Baptist, which was on the north side of the church, and in which the bishop a few days before his death, 16th Nov. 1200, desired to be buried. The work is supposed to include the present choir of the cathedral. (HUGH of Burgundy.) A family of the name of Du Noyer came over to England with the conqueror and settled in the diocese of Lincoln, where it became one of the county families, as it continues to this day; PARKER, in *Archæologia*, 1871, xliii, p. 89.

NOINVILLE (MARTIN), was architecte des bâtimens du roi in 1677. HOZIER, *Registre I, Armorial Général*, fol., Paris, 1738, p. 354.

NOINVILLE (. . . de), pupil of J. H. Mansart, built 1686 the place Royale at Dijon; 1697 the portail, raised to the middle of the *œil de bœuf* of the great hall of the hospital, which was not completed till 1842; the church of S. Etienne, not completed in 1721; and the decoration of the lecture hall of the academy. COURTÈPE, *Notice sur la ville*.

NOIR (N. LE), see **LENOIR** (N.)

NOLA (The Oscan or Etruscan **NUVLANA**). A town near Naples, in the province of Terra di Lavoro. It is walled, has five gates, and is the see of a bishop. The cathedral is dedicated to the Assumption of the Virgin, and there are many other churches. It is reported that bells for calling people to church were first introduced here by Paulinus, in the fifth century. There are some good buildings, a fine market place, and large cavalry barracks. Specimens of one of the most valuable classes of fictile vases of the Græco-Italian period have been found here, supposed to have been introduced by the Corinthian potters Euchier and Eugrammos, who were brought to Italy by Demaratus about 600 B.C. LEO AMBROSIO, *De Nola Opusculum*, etc., fol., Venice, 1514, gives four maps and plans. REMONDINI, *Storia Ecclesiastica Nolana*, 1747.

14. 28. 50. 96.

NOLA (GIOVANNI DA); see **MERLIANO** (G.)

NOMENCLATURE. The art of naming; a vocabulary or dictionary of technical language peculiar to any art or science. It here applies chiefly to the periods of architecture prevalent during the mediæval era. See **ENGLISH** and **FRENCH**, which includes the nomenclatures of Britton, Rickman, and others; and of de Caumont and other French authors. Terms used in architecture, when placed together, are more usually called a **GLOSSARY**. **DICTIONARY**.

GARBETT, *Nomenclature of English styles*, in *BUILDER Journal*, 1851, ix, 619. WILLIS, *Architectural Nomenclature of the Middle Ages*, 4to., for the Cambridge Antiquarian Society, No. ix, 4to., Lond., 1844. *ECCLESIOLOGIST Journal*, 1845, p. 49; and 1847, viii, 33. FREEMAN, *Nomen. of Geometrical and Flowing Tracery*: and by COX, *On the Nomen. at present in use*, 1852, xiii, 117.

NON-ABSORBENT MATERIAL. See **ABSORPTION** and **ATMOSPHERIC INFLUENCE**: also ROBERTS, *Healthy Dwellings*, read at Royal Inst. of Brit. Archts., 1861-62; and remarks by J. A. PICTON, in *BUILDER Journal*, xx, 72-3; and by READE, p. 119.

NON-CONDUCTOR. A substance through which the electric fluid passes with considerable difficulty, or not at all; such as glass, resin, sulphur, silk, hair, wool, the air, etc.; but these become electric by friction.

NON-CONDUCTING MATERIALS, as brick, mortar, earthenware, absorb radiant heat very slowly. The asphaltic felt used for

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roofing purposes is another material having the property of a non-conductor. It has been stated (by J. Nasmyth, at the Geological Society) as an instance of the low-conducting power of clay and sand, that a thickness of only half an inch of such matter intercepted the heat of a mass of eleven tons of white hot melted cast iron for twenty minutes, without the heat on the outside of the vessel being sufficient to pain the hand; CIVIL ENGINEER, etc. *Journal*, 1847, x, 94. A patent non-conducting and non-combustible composition for covering boilers, steam pipes, and other heated surfaces to prevent radiation, and also for protecting water pipes from frost; and for lining iron houses, studios, etc., received mention in 1865 at Dublin; and 1867 at Paris. Another is called an "expansion composition". These are extensively used for such purposes. Other such substances have been introduced for fireproof purposes, as in the manufacture of "monolithic doors", and for coating timbers to prevent access of heat or flame.

Fire-proofing to safes, placed between two walls of the wrought iron of which they are made, may to some extent come under the subject of this article. "Almost everything that one can think of has been either proposed or used for proofing,—water, wood, paper, plaster of Paris, chemicals of all sorts, and many other things besides. This fire-resisting material may be either of a refractory nature, such as fire clay, sand, or any other practically infusible slow conductor of heat; or it may be an absorbent substance containing chemicals that will evolve moisture when heated. The former of these two methods is now seldom used except by makers of cheap common safes, who sometimes use clay, ashes, or mould. The evaporating system is generally adopted, and as a rule the absorbent material is common sawdust, with which is mixed ordinary alum, the water of crystallisation in the alum being gradually parted with under the continued heat generated by fire" (evolving moisture which pervades the whole interior of the safe and its contents with steam, keeping down the temperature at or under that of boiling water or steam, in which books or papers will not burn, as stated for Milner's safes). "Mahogany sawdust is preferred as being less combustible than that of white woods. I prefer and use an incombustible material, very light and absorbent, which does not possess the bad qualities of sawdust, but which is more expensive. Supposing the alum to become exhausted, there still remains the protection of a substance which is both infusible and a bad conductor of heat. . . . There should be a space for three or four inches all round a safe of an evaporating non-conducting composition"; CHUBB, *Protection from Fire and Thieves*, 8vo., Lond., 1875. **CONDUCTOR OF HEAT. HEAT.**

NOOK SHAFT. In Lombard and Pisan buildings a nook shaft is used in place of an edge shaft. A shaft was placed in the nook or internal angle formed by the side and face of the two contiguous arches of a compound archway. On the plan they resemble **EDGE SHAFTS**, but the rib they support differs from an edge rib in not being united to the contiguous wall, but like its shaft is nestled into the re-entering angle formed by the side and face of the neighbouring arches. The section of the rib is most commonly exactly that of the shaft, or differs merely by being sculptured in a different manner; but sometimes octagon nook ribs are used with cylindrical nook shafts: WILLIS, *Remarks on Arch. of Italy*, etc., 8vo., Lond., 1835, p. 35.

A shaft or small column placed in a square reveal forming part of the jamb of an archway, whether of a door or a window, used very freely in Romanesque and early Pointed styles, and carrying an archmolding, frequently banded and always perfectly isolated.

NOORDENDORP (ADRIEN), born 1780 at the Hague, was contrôleur des palais et bâtimens royaux at that place, where he designed the palace of prince Frederick, and 1821 directed the enlargement and completion of the king's palace, called the

Old court. He died in 1835. GOETGHEBUER, *Choix*, fol., Ghent, 1827, p. 50, pl. 73. 24.

NORBA, in Latium; see NORMA.

NORBA CESAREA, see ALCANTARA, in Spain.

NORBERTINE MONKS were Premonstratensians. Their abbey of Ninove in Belgium was demolished in 1826, and the church built 1718 alone remains; it is a large cruciform building with a central dome and east tower; the interior is richly adorned with marble; the choir stalls well carved in oak. Another abbey is situated at Parck, near Louvain, founded 1129 by Godfrey le Barbu, duke of Lorraine; the present buildings, now again in the possession of the order, were erected in the 16th and 17th centuries; the church contains some fine carvings.

NORCIA (GIROLAMA DA), after 1525-42, executed the two lateral doorways of the cathedral at Aquila. His portrait is over the principal door.

NORCIA (S. C. DA), see CIPRIANI (S.)

NORDEN (JOHN), born about 1548, probably in Wiltshire, was chiefly a land surveyor, devoting his time to the preparation of *maps* of several counties, and of various *surveys* of royal domains, for which he received a stipend of £50 per annum. His chief publication was *The Surveyor's Dialogue*, 4to., Lond., 1607; 1610; 1618; and 8vo., 1738. It was also reprinted by this Society in *Detached Essays*, 1848. He died in, or soon after, 1624.

NORDHAUSEN. A town near Erfurt, in Prussian Saxony, situated on the little river Zorze. It is surrounded by walls flanked by towers, and entered by seven gates; Risle Kile was *baumeister* from 1377 of the *Petriturm*. It contains seven Lutheran churches: PUTTRICH, *Denkmale*, fol., Leipzig, 1836-52, pt. v, gives plates of the domkirche and the Marienkirche. Near the *rath-haus* is a Rolandsäule under a roof, being a statue about 18 ft. high, a symbol of the rights and privileges of the town. FORSTEMAN, *Geschichte der Stadt Nord. Müller, Handbuch*, 4 vols., 8vo., 1836. 14. 28. 50. 92.

NOREL (HENDRIK), designed 1733 the town hall; and 1752 the Roman Catholic church, both at Harlingen, where he also erected several of the best private houses. 24.

NORFOLK LATCH, see LATCH.

NORMA, near Cori, in Southern Italy, is situated near the site of NORBA, in Latium, which B.C. 492 became a Roman colony, and being burnt in the time of Sylla, *cir.* 82 B.C., was not rebuilt. The ruins are on a rocky ridge, north of the modern village; the walls are about 7000 ft. in circuit, and the blocks varying from 3 ft. to 10 ft. in length, are fine examples of polygonal masonry. Four gates may be traced. Within the walls is a large quadrilateral enclosure of polygonal masonry containing channels for the conveyance of water; wells and reservoirs are found near it, with the remains of a temple. The acropolis appears to have been surrounded by a triple wall: subterranean watercourses and passages leading to sally ports have been found under its site. DODWELL, *Cyclopean Remains*, fol., Lond., 1834, gives several plates of the remains, supposed to be of Pelasgian origin. 28.

NORMAN (JUAN). Nothing is known of the directors of the building of the cathedral at Seville, until the year 1462, when, the work being then half completed, Juan Norman was *maestro mayor*; he discharged the duties in conjunction with the overseer, Pedro de Toledo, until 1472, in which year he was superseded by order of the chapter, which determined that "thenceforth he should no longer be paid daily wages, but his regular pay in bread (food) and money." His duties were assigned to three persons, for the more rapid advancement of the work, namely Pedro de Toledo, Francisco de Rodriguez, and Juan de Hoces. 66.

NORMAN ARCHITECTURE. One of the local modifications of the generic style comprehended under the terms LOUARDIC, ROMANESQUE, and even BYZANTINE, and of which the distinctive and characteristic feature is the round-headed

or semicircular arch. Being imported into this country from Normandy, it has obtained the epithet which it bears, and the examples in England are frequently distinguished by that of "Anglo-Norman". The term Norman is also used in relation to the early architecture of a part of France and of Sicily, with parts of Italy; the local variations therefore will be noticed under the name of the country where they occurred.

As early as 810 the dwellers on the northern shores of the European mainland began to suffer from the descents of the Danish Norsemen, who, soon extending their ravages from the Elbe to the Garonne, formed settlements in Aquitania, and proceeded thence to Spain, plundering in 844 the coast of Galicia, afterwards landing in Andalusia, where, however, they were defeated near Seville by the Moorish prince Abdur-Rahman. Between 859 and 860 they forced their way into the Mediterranean, wasted the coasts of Spain, Africa, and the Balearic isles, penetrated up the Rhone as far as Valence, and then turning in the direction of Italy, burned Pisa and Lucca, and even reached the distant isles of Greece, before their rage for destruction satiated, they turned their thoughts homewards. From Norway issued the last and most important expedition of Northmen against the coasts of France. It was led 876 by Rolf or Rollo, who after ravaging the north, south, and east portions, forced Charles the simple in 911 to grant him possession of all the land of the valley of the Seine, from the Epte and Eure to the sea: the ceded province became the duchy of Normandy. They and their descendants are, strictly speaking, the Normans of history. They conquered England in 1066: having proceeded earlier to Sicily and Southern Italy, where their power became extinct late in the twelfth century. SICULO-NORMAN; SICILIAN ARCHITECTURE.

At the period of their establishment in Neustria, the northern portion of France, the later Romanesque architecture, undoubtedly derived from the Rhenish Byzantine, had taken its ultimate form and character; this style was adopted and continued to be practised upwards of two hundred years. The two celebrated abbeys at Caen were completed just before and after 1066 the time of the conquest of England; the abbey at Bernay dates 1030; that at Jumièges (plain) 1067; S. Georges de Boscherville (rich) 1057, where the zigzag moulding appears in the early rich choir, and not in the later and plain nave. Lisieux and Abbeville were both erected from west to east. The leading characteristics of this style in France, were size and massiveness. The Basilican plan was adopted of a central and side aisles, with an eastern semicircular apse. The tower (often a central one with two at the west end) was a distinguishing feature, becoming developed as the style advanced. The ornaments are of great variety; the most common and distinctive are the zigzag, billet, chevron, nailhead, embattled fret, cable, and others.—"At this period (12th century) French foliated carving had become strongly tinged by Byzantine taste;—when the seat of Imperial government was removed from Rome to Constantinople, the architectural sculptors seem to have reverted to Greek examples, as distinguished from Roman. It followed that, not only at Ravenna—but centuries later, when the style was a second time transplanted into Western Europe, a Greek tinge was given to the works of those schools of architectural carving which were influenced by it; and this was the case not only in those parts of France where, as in Perigord, Byzantine architecture was in a pronounced form, but it extended even into the Northern provinces, whose architecture was in other respects purely Romanesque.—The capitals were not only founded on the Corinthian, but their leaves were often Greek, as distinguished from the Roman, type of the acanthus. From this leaf, by different stages, and especially from specimens left unraffed, was developed the very different leaf known as the *crochet*, and the very typical French capital known as the capital *à crochet*." Sir G. G. SCOTT, *Guide to the Royal Architectural Museum*, 8vo., 1876, who refers to a series of casts of semi-Byzantine capitals

from Nôtre Dame at Paris, 1163-90; from S. Denis, 1150-60; the western portals at Chartres, and many others. The windows and doors are simple, with semicircular arched heads, the former without tracery. The tympanum of the door arch forming a square-headed opening is occasionally filled with sculpture. The walls were so massive as to render buttresses unnecessary, yet slight projections recalling such features appear. The masonry of the early work was rude, the joints being large, and the stones generally unhewn. PARKER, *Abbey Churches at Caen*, in *Sessional Papers* of Inst. of Brit. Archts., 1862-63, p. 104, notices the distinction of three methods of jointing employed in early mediæval work (JOINTING STONEWORK). The nave arches are carried on large single pillars or piers; but later, on piers with shafts, which are almost always recessed in nooks (or nook shafts). Owing to the great size of the buildings, the main aisle or nave was not vaulted, but had usually a timber roof, with sometimes a flat ceiling of wood; the aisles were vaulted. Cloisters of this period exist in the abbaye Blanche at Mortain, and at Mont S. Michel, both in Normandy, with a few others.

THE ALLGEMEINE BAUZEITUNG, 1845, pl. 671-81, illustrates the *Architecture of Normandy*, from all the churches at Caen, and the cathedrals, etc., of that part of France. DAWSON TURNER, *Tour in N.*, 8vo., Lond., 1820; COTMAN and TURNER, *Arch. Antiq. of N.*, fol., Lond., 1820; STOTHARD, *Letters written during a Tour*, 4to., Lond., 1820; and *Normandy—Architecture of the Middle Ages*, in QUARTERLY REVIEW, No. 49, April 1821. Du Bois, *Itin. Hist., et Mont.*, 8vo., Paris, 1828. GODWIN, *Ancient Arch. Remains in Lower N.*, 8vo., 1837. DE LUYNES, *Recherches sur les Mons. et l'Hist. de Nor.*, fol., 1844. JANIN, *La Normandie Historique*, etc., 8vo., 1840. JOLIMENT, *Mons. de la N.* GALLY KNIGHT, *Arch. Tour in N.*, 8vo., 1836. NODIER and TAYLOR, *Voyages Pitt.*, etc., fol., Paris, 1820-25; DUCAREL, *Anglo-Norman Antiq.*, fol., Lond., 1767. WHEATON, *History of the Northmen*, etc., 8vo., 1831. BRITTON, PUGIN, and LE KEUX, *Specimens of the Arch. Antiq. of N.*, 4to., Lond., 1826-28: new edit. by SPIERS, 4to., Lond., 1874. COCHET, *Nor. Souterraine*, 1854; BORDEAU, POTIER, et CHARMA, *La Nor. Illustrée*, fol., 1852-5. BENOIST and LALASSE, *La Norm.*, etc., fol., 1854. STEPHENS, *Nor., its Gothic Arch. and History*, 25 photos., 8vo., 1865. BLACKBURN, *Normandy Picturesque*, 4to., 1869. MACQUOID, *Through Normandy*, 8vo., Lond., 1875. VASSEUR, *De Normandie en Nivernais*, in DE CAUMONT, *Bulletin Mont.*, 8vo., Caen, 1868, ser. 4, iii, 5; iv, 190, 317, 607. *Ramble through Normandy*, in BUILDING NEWS Journal, 1874, xxvi, 251-6; and *Notes in Normandy*, by E. W. GODWIN, 1874, xxvii, 251, 307, 395, 572.

Norman architecture in England is usually considered to have prevailed from the Conquest, 1066, through the reigns of kings William I (1066) and II (1087), Henry I (1100), and Stephen (1135-54); and the *Transition* during Henry II (1154-89). Many local peculiarities of the Anglo-Saxon style, which were found in the country, were, however, preserved. The Anglo-Norman work is heavier than the French Norman; the style became lighter, as in Ely cathedral, and also in Durham Galilee about 1180. The walling at Rochester cathedral, of the time of Gundulph, is figured *s.v.* HERRING-BONE WORK. The early masonry is coarse, as if hewn with a hatchet until 1110; the heights of the courses vary from 6 to 9 in. only, 7 to 8 in. being the average (J. A. REYTON, in *Journal of the Archaeological Association*, 1848, iii, 105-6); the masonry of later Norman buildings is very well executed. The cylindrical nave piers were much more massive than those in France; and to relieve the heaviness, the chevron, spiral, and other groovings were cut. The mouldings are the same as those used in France; about the latter part of the twelfth century they were, however, gradually disused, and not many years afterwards were totally discontinued; the dog tooth ornament of the Transition period, large and coarsely worked, appears, and occurs in

combination with the billet at Canterbury. The Pointed arch occurs previous to 1150, but with Norman details and mouldings. The semicircular apse was gradually given up in England, and towards the end of the style the square apse was universally adopted. It is said there is not a Norman cloister in England. The nave was usually covered by a flat ceiling, and not vaulted; BILLINGS, however, has maintained that the Norman groining at Durham cathedral was supported by Norman flying buttresses. The chancel of Warkworth church, Northumberland, 13 ft. 9 in. wide, still retains Norman groining. Crypts and aisles were vaulted. The greatest display of ornament was lavished on the doorways, the arch of which often consists of a repetition of many enriched bands, one within another. The three west doors at Lincoln cathedral may be compared with the very curious Norman door at Kilpeck church, Herefordshire; they are much ruder and probably earlier than Lincoln, but the general character of the ornament is the same. Rich doors occur at Rochester, *cir.* 1180. The windows were small in proportion, and sometimes divided by a column into two lights within the external arch. Round headed windows were used.

In *Guide to the Royal Architectural Museum*, 8vo., London, 1876, Sir G. G. SCOTT notices the beautiful slab of the tomb of Gundreda, found at Lewes; details from the infirmary at Ely *cir.* 1150, showing the style in its highest development, though as yet free from transitional elements; others from Adel church, near Leeds, of a slightly earlier date; and from Birkin church, Yorkshire; the doorway from Barfeston church, Kent, an exquisite specimen of pure and highly refined work: rich capitals from the slype at S. Alban's, and those for the Inner Temple hall. "When the period of the great transition is reached", he adds, "nothing can be more instructive or more interesting than to trace the evidences of this new phase of artistic vigour and enthusiasm. The very workmanship passes almost suddenly from comparative rudeness into a degree of refinement which our modern masons find it next to impossible to imitate; while carved ornamentation, wall-painting, glass-painting, illuminated manuscripts, jewelry, and goldsmiths' work, iron and brass work, ivory carving, enamel and mosaic work, and almost every form of decorative art almost suddenly leapt to a degree of perfection which for ages had not been approached, and which, if after times exceeded in the technicalities of art, has never been surpassed in intrinsic vigour". . . . "Till about 1175 it would appear that the English followed up a *transition* of their own, founded upon their own Anglo-Norman style, as the church of S. Cross, near Winchester. After this date it became profoundly influenced by that of France, owing to the employment of a French architect, William of Sens, on the choir at Canterbury cathedral, where he profusely introduced the prevailing details of the French style, and especially the Byzantine version of the Corinthian capital, and its derivative, the capital *à crochet*. From this time forward, an English building is rarely to be found wholly free from French influence, especially evincing itself in the use of the *crochet* capital along with others of purely English origin—examples at Glastonbury abbey 1186-1200, S. David's 1180-1200, where the capitals, *à crochet*, are used alongside of every derivative of the Norman cushion capital."

The chapel 1081 in the White Tower in London, is the earliest example of pure Norman work in England. The cathedral of Rochester dates 1077-1130; S. Alban's 1077; Hereford 1079; Worcester 1084; Lincoln 1087-92-1146; Gloucester 1088; Ely 1081; Winchester 1079-1107; Durham 1093-1133; the Galilee 1180-97; Chichester 1091; Norwich 1096; Peterborough 1117-43-77; Oxford 1160-80; Exeter 1112; Canterbury 1115-30, rebuilt 1174; Salisbury 1107-39.

Keeps or donjons occur at Couisborough, London, Rochester, Newcastle-upon-Tyne, Dover, Norwich, Colchester, Castle Rising, Kenilworth, Richmond, Bamfborough, Porchester (Hants), Oakham, Newark, Sherborne. Abbey Gatehouse, at Bury S. Edmunds, dates 1121-30.

Melbourne church, Derbyshire, 144 ft. long, with a triforium, is almost a small Norman cathedral; WILKINS, in *Archæologia*, xiii. The round towers

of Norfolk are supposed to be of this date. Little Snoring church, Norfolk, has grouped with it a circular tower, the remains of an earlier church. 1070-93, Bury S. Edmunds abbey, Suffolk. 1107-39, Malmesbury abbey, Wiltshire. New Shoreham church, Sussex. 1073-88, Lastingham church, Yorkshire; Bilton church, near York. 1076-1100, Stow church, Lincolnshire. Castle Acre priory, Norfolk. Priory of S. Augustine at Canterbury, Kent. 1093, Christ church; Porchester church; S. Cross, 1136; and Romsey, in Hampshire. 1090, Malling abbey, Barfreston church, and S. Margaret at Cliffe church, Kent. Cir. 1160, Ilfley church, Oxfordshire. 1150, Stewkeley church, Bucks. 1080 or Wm. II, Tutbury church, Staffordshire. Southwell minster, and Workop abbey, Notts. Kirkstall; 1131, Rievaulx, Jervaulx, and 1132, Fountains, all abbeys and all in Yorkshire. 1093, Lindisfarne abbey. Steetly, Derbyshire, has a rounded apsis. In London, 1123-33, S. Bartholomew the Great; and 1185, the Temple, circular part. 1103, Tewkesbury, Gloucestershire. 1103, S. Botolph's priory church, at Colchester, and Waltham abbey, Essex. 1124, Caistor church, Northamptonshire. 1127, S. Sepulchre and S. Peter's churches, Northampton. 1136, Dorchester church, Oxfordshire. 1141-50, Shobdon church, Herefordshire. 1185, S. Joseph's chapel in Glastonbury abbey, Somersetshire; Wootton, Bishop's Cleeve, and Rudford churches, Gloucestershire. Ketton church, Rutlandshire.

Crypts occur at Ripon minster, Rescham (or Repton), Rochester, Winchester, Worcester, Gloucester.

Domestic buildings.—The walls of Westminster hall, part of the palace of William Rufus. The hall at Oakham castle. A manor house at Boothby Pagnel, Lincolnshire; another at Barnack, Northants. Pythagoras's school at Cambridge, formerly a grange. The Jew's house at Lincoln; another house, and a third, S. Mary's guild, usually called John of Gaunt's stables. Staircase in the Conventual buildings, Canterbury. Moyses' hall at Bury S. Edmunds, called the Jew's house. Hostelry of the priors of Lewes, in Southwark; Priory at Dover, Kent. King John's house at Warneford, Hampshire. Houses at Sutton Courtney, Berkshire; at Appleton, Berkshire; at Christ church, Hampshire; at Minster in the Isle of Thanet; and near the town wall at Southampton. These are all described, and most of them delineated, in TURNER, *Domestic Architecture*, 8vo., Oxford, 1851.

Norman architecture of Scotland is identical in character with that of the Southern portion of Great Britain, less pure in style and but few examples in an unmixed state: Dunfermline abbey: later in the twelfth century are the churches at Kelso, 1128; Dryburgh, Jedburgh, Dundrennan 1142; and Dunkeld, are cited as instances founded before the middle of the twelfth century; which also exhibit the transition in a more forward state than it had attained in England at the same date, a fact difficult to be accounted for, since the Scots at that period did not draw their style from any source independent of the Anglo-Norman school. Their system of military architecture is also the same as that of the Anglo-Normans, but they do not generally possess an equal degree of architectural character. MUIR, *Ancient Churches of Scotland*, 8vo., Lond., 1848, p. 104, notices "No stoup (unless the one noticed in Uphall church, Linlithgowshire, be an exception), aumbrye, piscina, or sedilia, of Norman date is to be met with in any Scotch example; and it may be remarked also as curious, that while the entrances to Norman naves are, for the most part, well preserved and decided in character, in no instance known to the writer does there appear a chancel doorway, which can be confidently regarded as an original detail of the building."

The abbeys of Jerpoint, co. Wexford; Boyle, co. Roscommon; and Ballintubber, co. Mayo; are the most interesting, as displaying the style in Ireland, and the progressive change to the early Pointed architecture. The stone roofed church of S. Doulagh, near Dublin, is stated to be the most perfect pre-Norman relic in Ireland; it was repaired by Mr. Sloane in 1860. Further details of the style are given in IRISH ARCHITECTURE.

The various *Histories* of architecture; and RICKMAN, *Attempt to discriminate*, 8vo., Lond., 1848, 5th edit. KNIGHT, *Pictorial History of England* (Norman architecture, by A. Poynter), 8vo., 1841. KING, *Cathedrals of England and Wales* (Murray), 8vo., 1861-69. 17, 19.

Sir W. C. JAMES, *The Norman Arch. of Canterbury Cath.*, read at the South Kensington museum, Jan. 1860, and printed in *Builder Journal*, xviii, 35; which 1863, xxiii, 865, 903, gives papers on *The Development of Norman Architecture*;

and in 1863, xxi, 543, PARKER, *The Chapel of the White Tower*, delivered at a meeting of the Ecclesiological Society.

NORMAND (CHARLES PIERRE JOSEPH), born 1764 or 1765, at Goyencourt (Somme), in France, of humble origin; was a pupil of the royal free school of design, of N. Bachelier, of — Thierry, and of G. de Gisors. In 1791 he obtained the second *grand prix* for architecture for a design for "a public gallery in a royal palace" (pl. 8-11); also a *prix d'émulation* for a design of "a hall upon the banks of a harbour" (pl. 12-15), and 1792 the *grand prix* for "a market for a large city" (pl. 19-20, DETOURNELLE, *Projets d'Arch.*, fol., Paris, 1810), 1793 a town house at Méhun (DETOURNELLE, *Arch. Nouvelle*, 4to., Paris, an. xiii (or 1805) pl. 15-6), and had a work in the exhibition of paintings in 1800, a model for a departmental column at Méhun (Seine et Marne), which obtained one of the ten prizes given. In 1801 he submitted a design for the monument to Desaix (DETOURNELLE, 4to., pl. 12); in 1802 the elevation and section of a design for a monument intended for the Institut National; a prize for encouragement; and soon after received 2000 francs for a design for the arc de l'Etoile. He went to Rome as a pupil of the academy of France, and the revolution preventing his benefiting by the pension, he took to engraving, and between 1800 and 1815 etched upwards of 7000 subjects; besides designing vignettes, etc., which gave such an impulse to illustrated books; the notes for the bank of France, Rouen, and Bordeaux; and the playing cards after the revolution. He partly prepared, or compiled and engraved the following publications, many of which are of high merit. *Ornements, Arabesques, Meubles, Frises*, etc., fol., 1800. *Nouveau recueil en divers genres d'ornemens — à la décoration*, 46 pl., fol., 1803. *Recueil de plans et de façades*, fol., 1815; 1823. *Nouveau Parallèle des ordres d'architecture des Grecs, des Romains, etc.*, 63 pl., fol., 1819-25 (translated by A. Pugin, London, 1829). *Le Vignole des Ouvriers*, 4to., 1821; and part ii in 1823. *Modèles d'orfèvrerie choisis aux expositions des produits d'industrie française au Louvre en 1819*, fol., 72 pl., 1822. Also *Œuvres de Serrurerie*, 54 pl., fol., 1824. *Le Guide de l'Ornemaniste*, fol., 1826. *Le Vignole des Architectes*, 4to., 1827; and part ii relating to the ornamentation of the five orders, etc., 1828. *Méthode abrégée du tracé des Ombres dans l'architecture*, 4to., 1827. *Parallèle de diverses méthodes, ou dessin de la perspective*, 4to., 80 pl., 1833. *Décorations intérieures, etc., pour maisons, édifices, et mons. publics*, with Beauvallet, Raphael, and Prudhon, 48 pl., 1804-6; and *Fragments d'Ornements dans le style antique*, conjointly with Beauvallet, 1810.

He likewise engraved the plates for Durand, *Parallèle d'Arch.*, 1800, and *Leçons d'Arch.*, 1801-5; the *Annales du Musée*, 1801-27, under the direction of Landon; *Description de Paris et ses Monuments*, by Le Grand and Landon, 1808, etc. He died February 1840, at Paris. *Notice sur la vie et les ouvrages de C. P. J. N.*, 8vo., Rome (1842). LOUIS MARIE, his son, born 1788, at Paris, was also an engraver of similar publications, principally for others. L. NORMAND (ainé in 1849), published *Paris Moderne*, 3 vols., 4to., Paris, 1837-49. There was another such engraver, CHARLES H. NORMAND, fils, in 1830 to 1841; and a Ch. NORMAND aîné in 1849.

NORMANDY (bishop ALEXANDER of), see LINCOLN.

NORMANDY GLASS; see LORRAINE GLASS.

NORMANDY STONE. The columns in the quadrangle of the second (1666) royal exchange in London, were to be of "a certaine marble found in the west country (rather) than of Normandy stone of which they were made before." *Reports on the Royal Exchange*, 72. Probably Caen stone was meant.

NORMANT (... LE), designed 1844-49 the church in the faubourg du Pollet at Dieppe, given in GOUILLIER, etc., *Choix d'édifices*, fol., Paris, 1837-44, iii, pl. 327-8.

NORRIS (RICHARD) was surveyor to Christ's Hospital estate, in which he was succeeded by J. Lewis. He was also

surveyor to the Sun Fire company, the Clothworkers' company, and to the Charterhouse estates. Among the buildings he designed was 1730 Dunham Massey, Cheshire, for the earl of Stamford and Warrington. He was one of the original fifteen members of the Architects' club, formed 20th October 1791. He died 7th January 1792. GENTLEMAN'S MAGAZINE, lxii, pt. 1, p. 91.

NORRY (CHARLES), born 1756, at Bercy (Seine) was a pupil of Rousset and De Wailly at the Royal Academy, where he carried off several prizes of emulation. He was attached to the French commission in the expedition to Egypt, and assisted in editing the great work published by the Government. He exhibited several designs; was inspector-general in the conseil des bâtiments civils until 1829, when he became an honorary member; was one of the consulting committee for the royal buildings; and was made 1825 a chevalier of the Legion of Honour. He wrote *Relation de l'expédition d'Égypte*, etc., 1799; and *La décade Égyptienne*, 4to., 1800. He died 1832, at Paris. 110.

NORTHAMPTON. The principal town of the county of the same name in England. It consists of four main streets meeting in a large open market place, one of the finest in England. All Saints' church, designed 1680 by Sir C. Wren, has a portico of twelve Ionic columns; S. Peter's, a good specimen of decorated Norman architecture, was restored 1850-51; and S. Sepulchre's, supposed to have been built by the Knights Templars, one of the round churches in England, was restored 1861-67, both by G. G. Scott. The town hall (Decorated Gothic) was designed 1861-5 by E. W. Godwin, at a cost of about £12,000; a description, with illustrations of the sculpture, is given in *BUILDING NEWS Journal*, 8th Nov. 1861; 2nd Oct. 1863; 27th May 1864, p. 399, and 10th Nov. 1865, p. 788. One of the queen Eleanor crosses still exists in the town.

Reports and Papers—of Arch. Societies—Archdeaconry of Northampton, from 1850. *BUILDER Journal*, 1859, xviii, 603; and xx, *passim*. *Restored Churches of Northamptonshire*, in *BUILDING NEWS Journal*, 1864, p. 800. *History and Antiquities of Northamptonshire*, reprinted from the Quarterly Review (Murray) 1864.

NORTH ASPECT, see ASPECT.

NORTHWRAM QUARRY, in Yorkshire, see HALIFAX STONE.

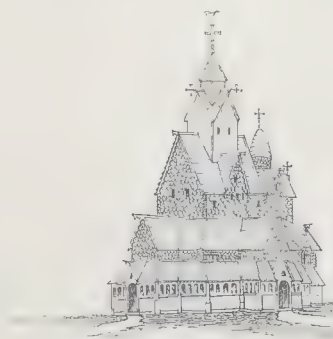
NORTH SIDE of the church. It was regarded as the source of the cold wind, and the haunt of Satan. In some Cornish churches (as at Wellcombe, near Morvenstow) there is an entrance called the Devil's door, adjoining the font, which was only opened at the time of the renunciation made in baptism, for the escape of the fiend. In consequence of these superstitions, and its sunless aspect, the northern part of churchyards are usually devoid of graves; WALCOTT, *Sacred Archaeology*, 8vo., Lond., 1868. Thus, at S. Helen's, near Cockburnspath, in Berwickshire, it does not appear to have been ever used for the purposes of interment; MUIR, *Churches of Scotland*, 8vo., Lond., 1848, p. 64. Robert de Behal, prior of S. Oswald, at Nostel in Yorkshire, who died 1255, desired to be buried "on the north side of the cemetery amongst the worms and the nettles, because that place would hereafter do glory to God", which did happen, for the next prior but one erected a chapel on that spot in honour of the Virgin Mary; ASSOCIATED SOCIETIES, *Reports and Papers*, 1854-55, p. 241.

The north door of a church is often traditionally called the "bachelor's door"; ECCLESIOLOGIST *Journal*, v, p. 44; and it is often, even in small churches, placed opposite another at the south side, for the separation of the sexes. MATTLAND CLUB, *Chronicles of Perth*, 4to., Edinb., 1831, p. 54, records, 19th May 1582, that a woman was "ordained to be put in the ward of the fornicators, above the north kirk door".

NORTON (MASTER) or MORTON, "magister ecclesiæ de Radelyff", according to NASMITH, *Itin. de W. de W.*, 4to., ARCH. PUB. SOC.

Lond., 1788, p. 220, 244. He is also described as the master mason employed *cir.* 1442 to carry on the work of completing S. Mary Redcliffe church, at Bristol, at the west end, and also the portion of the spire as it appeared before its completion after 1846; SOCIETY OF ANTIQUARIES, *Archæologia*, 1853, xxxv, 279-97.

NORWEGIAN ARCHITECTURE. The historic period of Norway commences with Harald or Haarfager, who died in 933. With the exception of the cathedral of THRONDHJEM, founded 1180 or 1183, and a few other churches, which are of stone and not of much interest, the churches are all of timber. When the Norwegians were about to restore (1183) the cathedral at THRONDHJEM (founded 1016-30), they sent artists to Orkney to make drawings of the cathedral of S. Magnus there (founded 1138), "because it was built by the Norwegians in the olden time"; thus showing their belief that there was a peculiarity of style belonging to that race of people; FERGUSON, in R.I.B.A. *Sessional Papers*, 1850-51, p. 9. A small church dedicated to S. Clement, now forming a chapel at the east end (on the site of a timber chapel), and said to have been founded 1019, is probably the most ancient building in Norway; they both have round arches, and were probably built by workmen from England or Normandy. Many of the timber-built churches are of great interest, and exhibit the wonderful durability of the Norwegian pine, of which they are constructed. They are generally built in the form of a cross, with a tower in the centre terminating in a cupola or spire, with high pitched roofs, often covered with scale-shaped shingles, and are of large proportions; their general effect is massive. The details are elaborate; rounded apses to the chancels; transepts, chapels, and porches, exterior cloistered galleries, lofty spires or cupolas, all richly ornamented with encircled crosses on the gables, and dragons' heads carved in bold relief projecting from the angles, break the general outline with all that picturesque variety which is peculiar to Gothic architecture. They are often painted of a rich brown colour resembling chesnut or dark oak; sometimes of a bright red. Some of the oldest of these churches date back to the eleventh or twelfth century. They seem to be a close imitation in wood, by native workmen, of the style of ecclesiastical architecture employed in the masonry of that period. Such is the square church of BORGUND, near Lierdal-Soren (the bell tower is detached); HITTERDAL (square, 84 ft. by 57 ft.) in the Tellemarken, perhaps the largest and finest specimen; it was restored 1849-50, by Nebelung; another timber church was



CHURCH AT HITTERDAL.

pulled down 1837 by the then king of Prussia, and re-erected on a hill near his château of Erdmannsdorf, in Silesia. The nave, aisles, and chancel of a church at Urnes. These three buildings, with the peculiar ornamentations to the doors, are given in DAHL, *Denkmale Holz Baukunst in Norwegens*, fol. Dresden, 1837. The Bergen museum contains a picture taken

from a church on the Sogne-Fjord; it is of the Byzantine school, and represents Chosroes king of Persia carrying off the Holy Cross from Jerusalem, and the emperor Heraclius attacking and slaying him, etc. It would be interesting to connect this picture with the return of Sigurd from the crusade which he undertook in 1107, with a fleet of sixty ships; he was four years absent, and visited England, Sicily, Jerusalem, Constantinople, and returned home through Germany; FORESTER, p. 175-8, 230, 291. NORMANDY, etc.

The ECCLESIOLOGIST *Journal*, 1858, p. 49 and 77, gives an epitome of the *Annual Reports* 1847-58 of the Association for the preservation of the Memorials of Norwegian Antiquities (*Foreningen til Norske Fortidsminde-merkens Bevaring*), fol. plates, text 8vo., Christ., 1847-73. It also refers to a *Catalogue* of the remains of art and handicraft in Norway from the middle ages, probably the *Arkæologisk historisk*, by N. Nicolaysen, 8vo., Christ., 1855. The following notes are abridged from the *Journal*:

Certain churches at Odde, Ullingsvang, Kinnservik, and Eidfjord, bear marks of English workmanship. The ruins of Lysekloster, the first Cistercian monastery in Norway, founded by an English brother of the order from Fountains, in Yorkshire; and Hovedön was 1147 the second of the same order, by a brother from Kirkstead, in Lincolnshire; it was burnt 1532, and not restored.

S. Mary's church at Bergen, of the basilican type, of Romanesque design and date, is the only complete example among Norwegian churches.

A small timber dwelling at Stensund in the Dahl district, built 1324.

The church of Møster, in South Bergenhus Amt, is supposed to be the oldest in Norway, and to have been built by Olaf Trygvason in 906, in the very spot where he had ordered mass to be said on his arrival from England. It is described as composed of a porch 10 ells by 6, a nave 13 ells by 18, and a chancel 6 ells square, and without vaults or tower, but the bells hung under the roof.

The church at Hedal, in Valdres, near the Spirilen lake, *cir.* 1350 or 1050! deserted 1350, rediscovered near the end of the 17th cent.; considerable additions made to it in 1699.

Ringsaker (stone) church, in Hedemarken Amt, *cir.* 1021, is one of the six basilica-planned churches now existing from old times, including the cathedrals of Throndhjem and Stavanger; the transepts and choir were added about two hundred years later, and are of the first Pointed style.

Reinhild timber church, near the above, built between 1250-1450, has an almost unaltered nave and chancel, both 20 ft. by 40 ft., and a semi-circular apse raised on two steps.

Hurum and Lomen churches in the Valdres district, both of timber, *cir.* 12th cent. to middle of 13th cent.

A mound in the parish of Tane was opened in 1874, and found to contain a vessel of the Viking period, used as a sarcophagus for the chieftain, and conveyed inland, horses, etc., being buried with him, and earth accumulated over and around the ship; BUILDING NEWS *Journal*, 1874, xxvi, 459.

The modern works are the reflex of the architecture of other countries, as noticed under some of the chief towns; Christiania, Friedrickshall, Drammen, Lauvig, Skien, Arendal, Christiansand, Stavanger, Bergen, Christiansund, Throndhjem, and Tromsø.

SKOLDBERG, *Beskrifning*, etc., 8vo., Stockh., 1846. VON BUCH, *Travels through Norway and Lapland*, 4to., 1813. ALF SMITH, *Sketches in N.*, etc. EVEREST, *Journey through N.*, etc., 8vo., Lond., 1829. LAING, *Journal of a residence in N.*, 1837. TONSBURG, *Illustr. Handbook for Travellers*, 8vo., Christ. and Lond., 1875. TENNENBERG, *The Vade Mecum, or ABC Guide to Denmark, Sweden, and Norway*, Lond., 1875. HUBERT SMITH, *Tent Life in Norway*, 8vo., 1874. FORESTER, *Norway in 1848-49*, 8vo., Lond., 1850. BENNETT, *Handbook or Guide*, new edit., 1876. The Hitterdal doors are given in WEALE, *Quarterly Papers*, 4to., Lond., 1843-5.

NORWEGIAN TIMBER; see BATTEN, DEAL, and TIMBER. Some of the superior Longsound timber is of excellent quality, and is perhaps the most durable of fir timber, especially for exposed works. The qualities are noticed in BUILDING NEWS *Journal*, 1875, xxviii, 393; and descriptions relating to the exportation of timber houses from Christiania,

in the same *Journal*, 1873, xxv, 9, 233; xxvi, 172, 214, and 524 the paper by F. E. Thicke, read at the Society of Arts.

NORWICH (the Latin VENTA IORNORUM, also applied to Caistor.) The principal town of the county of Norfolk, in England, situated on the river Wensum, over which are nine bridges; Bishop's bridge, having three pointed arches with stone ribs, dates from 1340; Blackfriars, rebuilt 1789-90, by Sir J. Soane, R.A., the joints of the arch, 44 ft. span, were leaded to prevent friction; and Fybridge, rebuilt 1829 of cast iron, of which material are most of the others. Fragments of the walls, erected 1294-1320, three miles in extent, still exist, but nothing of the twelve gates. The castle was founded by Uffa, *cir.* 575; the keep, rebuilt by Roger Bigod in the Norman period, resembled in arrangement that of Castle Rising. It is 110 ft. 3 in. from east to west, 92 ft. 10 in. from north to south, and 69 ft. 6 in. high to the battlements; of two floors, the basement being 24 ft. high. The edifice was adapted 1792-93 for the county gaol, and Bigod's tower at the east angle restored by W. Wilkins as well as the castle itself; and also 1827-34, under F. Stone, county surveyor, it was cased with slabs, each of several feet in area, but with false joints cut and pointed up to imitate the original masonry: the works were continued by A. Salvin up to 1838 (BUILDING *Journal*, xix, 467). Illustrations in the *Archæologia*, by W. WILKINS, 1795, xii, 145 *et seq.*; in 1834, by J. W. ROBERTS; also by S. WOODWARD, *History and Antiquities of Norwich Castle*, 4to., Lond., 1847. Over the inner ditch is a bridge 150 ft. long, with one arch of 40 or 43 ft. span, of the Norman period. The market place is amongst the largest in the kingdom. On the road to Caistor is a Roman camp, being a parallelogram containing about thirty acres.

Norwich is the see of a bishopric, which was removed 1094 from Thetford. The cathedral, dedicated to the Holy Trinity and also called Christ church, was founded for Benedictines 1096 by William HERBERT de Losinga. It is cruciform in plan, and almost wholly Norman, the choir and central tower (140 ft. 5 in. high) date 1094, the bases of the pinnacles were renewed from 1827; and the tower restored *cir.* 1857, by J. Brown; the spire dates 1361, and with the weathercock is 315 ft. high. There are several chapels at the east end, which is circular; when restored about 1871, the original bishop's throne was found. The transepts are without aisles; the lierne vaulting of the nave dates 1426-36, its bosses are curious and comprise 328 figures (BROWNE), the subjects extending from the Creation to the last Day of Judgment; they were recoloured and gilt 1871, and have been published in photography by dean GOULBURN, *The Ancient Sculptures*, etc., 4to., Lond., 1876. W. Hyndley is supposed to have designed the rood screen, 1475-1505; the sixty-two stalls have the usual carvings under the movable seats, dating about 1480. The cloisters, situated on the south side, are nearly perfect, and present a series of work from the early Decorated period, 1297, to the Perpendicular, 1430; they average about 175 ft. square, and are 12 ft. wide; R. Upphale was the first designer; there is a fine lavatory in one of the alleys; and the groined roof contains a numerous and interesting set of bosses. The west doorway and great window over it were rebuilt 1426-36; the front repaired about 1818 by F. Stone; and about 1840 by E. Blore.

The total length is 407 ft. inside; the transepts 191 ft.; the nave 204 ft. long and 69 ft. high; the choir 183 ft. long; the nave and aisles 71 ft. wide; the choir 57 ft. wide and 83 ft. 6 in. high.

The dormitory, refectory, and strangers' hall, which latter is partly in the Early English style, still exist. S. Ethelbert's gate 1272 (Decorated); Erpingham gate, after 1411-28 (Perpendicular); and the Water gate at the south-east angle of the cathedral precincts, are valuable specimens. The bishop's palace 1318 has a chapel and entrance gateway: the kitchen

is large and has a lofty vaulted roof; a new north wing was added 1858 by E. Christian (*BUILDER Journal*, xvi, 712). The channel house, 1315, now the grammar school, has some good work.

There are thirty-six parish churches, also the sites of twenty-two desecrated churches, and many chapels. Of these, S. Bennet, S. Etheldred, and S. Julian have round towers, supposed to have been of Norman erection. The Perpendicular style prevails in most of the churches, nearly all of which have good steeples; S. Peter Mancroft, the largest and best, is 146 ft. long by 67 ft. 3 ins. wide, and 60 ft. high inside (212 ft. by 70 ft.). It was rebuilt 1430-55; the tower, 32 ft. square, is 99 ft. high. The edifice was restored 1850-62, by R. M. Phipson (a view in *BUILDER Journal*, 1862, xix, 389). Of the remainder, the most remarkable are: S. Andrew Colegate, completed 1506: S. George Colegate, *cir.* 1459, having a lofty tower: S. Gregory has a passage of Early English date under the chancel: S. Giles, one of the best, rebuilt *temp.* Richard II; its tower is 116 ft. high; S. John Sepulchre (Perpendicular), cruciform, with a lofty tower; S. John Maddermarket, restored 1863 by Elmslie, Francy, and Haddon; S. Michael Coslany (Early English and Perpendicular), a fine specimen of flint work: S. Lawrence, tower 112 ft. high: S. Saviour, restored 1858 by Goodwin and Butcher; and S. Stephen, are all Perpendicular: the last has glass dating 1601, and is the only city church completed after the Reformation; it was restored 1858. There are about twenty-two Dissenting and Roman Catholic chapels; of which, one of the Independents (Doric), and the Unitarians (Corinthian) with an octangular dome, are the best.

Amongst the public edifices are, the shire hall, 1822-23 (Tudor, in brick and cement), by W. Wilkins, R.A.: Guildhall, 1407-13, a good specimen of flint work; since repaired and altered: S. Andrew's hall (Perpendicular), originally the nave of the church of the Dominican or Black Friars, now among the largest halls used for municipal purposes in England; it is 124 ft. long, 70 ft. wide, having seven arches on each side, and 56 feet high to the panelled ceiling; it was restored 1863 by T. D. Barry (*BUILDER Journal*, xxi, 451, 634): the choir, without aisles, was long used as the Dutch Church, and with the kitchen, dormitory, etc., but lately for the work-house; it was altered, etc., 1861, by J. Benest and Newson, for a commercial school for king Edward VI's grammar school: bridewell, 1403, the finest specimen of squared flint construction, now a cigar factory: new workhouse, 1857-59, by Medland and Maberly, of Gloucester, cost about £21,000 (*BUILDER Journal*, xiv, 411; xvii, 574; *BUILDING News Journal*, iii, 991; v, 728): corn exchange, rebuilt 1861-62 by T. D. Barry and H. Butcher (*BUILDER Journal*, xix, 253; 786; and xx, 115, with interior view): new fish and poultry market, 1854, by A. Trimen (*CIVIL ENGINEER*, etc. *Journal*, xvii, 241): theatre, rebuilt 1826 by W. Wilkins: masonic hall (formerly the assembly house, 1754, by T. Ivory): public library, a school of art, and part of the museum and library of the literary institution, all in a building erected 1856-7, by James Benest, city architect, at a total cost of £6,500: and the literary institution and Norfolk and Norwich museum, adjoining the above library, erected 1839, which contains a library of 20,000 volumes, a very complete collection of British birds, and the Gunn collection of Norfolk fossils.

The ancient domestic examples are as follows:—Adjoining S. George Tombland is a house dating 1657, and another 1549: a doorway at east end of S. George Colegate, 1566: on south side of S. Andrew, Broad Street, a house 1386: near S. John Maddermarket, the Strangers' hall, *temp.* Edw. VI.—James I.: near S. Peter Mancroft, part of a house *temp.* Henry VIII, having a good paneled ceiling, a groined vaulted cellar, and panels of moulded brick with arms, etc., which seem to be cast from the same moulds as some at East Barsham Hall: the houses in Bishopsgate Street are very old.

BLOMEFIELD, *History of the County*, 8vo., 1806; *The Norfolk Tour*, 12mo., 1795. STACY, *Top. and Hist. Account of City and County*, 8vo., 1819. BRAYLEY, *Beauties of England*, etc., 8vo., 1810. WINKLE, *Cathedrals*, 8vo., 1835. BRITTON, *Antiq. of the Cath.*, 4to., 1816; 1835; and *Arch. Antiquities*. BROWNE, *Antiq. of the Cath.*, etc., 8vo., 1712. COTMAN, *Architectural Remains*, fol., 1838; and *Sketches*, fol., 1818. LADBROKE, *Churches of Norfolk*, 4to., 1843. STONE, *Pict. Views of Bridges*, fol., 1831. WILKINS, *On the Vanta Iconorum*, etc., in *ARCHÆOLOGIA*, xii, 1796. RICKMAN, *Attempt*, etc., 8vo., 1835, 4th edit. KING, *Cathedrals*, publ. by Murray, 12mo., 1862. KIRKPATRICK, *History of Religious Orders*, edited by D. Turner, 8vo., Lond., 1845; *The Visitor's Handbook*, 12mo., Norwich, 1849. TAYLOR, *Index to the Abbeyes*, etc., fol., 1821. *Archæological Institute of Great Britain and Ireland, Meeting*, 1847; also detailed in *ILLUSTRATED LONDON NEWS*, xi, 85, 100; and *BUILDER Journal*, v, 369. *British Archæological Association, Proceedings*, 1857.

NÖSE. A projection is so called; see BIT; BULL'S NÖSE: CHINBEAK.

NÖSING. The edge of a step projecting before the riser. It is rounded only in common stairs, but in superior ones it has a fillet and hollow under it in addition; it is then called "moulded". Where the outer string is "cut", the nosing is returned on the string and mitred and returned to stop. In stone stairs the mouldings are even sometimes carried along the back of the steps. 1. 2.

NOTABILE, of the Aragonese kings; see CITTÀ VECCHIA in Malta.

NOTATION, ARCHITECTURAL. The manner of marking dimensions on drawings and engravings. Prof. Donaldson in 1837 read a paper at the Institute of British Architects showing "that nineteen authors, from the time of James Stuart to the present period, have thirteen different ways of notation", which he tabulated; and proposed the system of writing $1''^{\circ} 2'.5''$ where 1 ft. 2½ in. would be meant, which system he had adopted in his own publications. The paper is printed in *CIVIL ENGINEER*, etc. *Journal*, i, 73. On p. 107 it is submitted that the denomination (") should be omitted, or only be applied to twelfths and not to tenths of inches.

The Roman notation (wherein cl. denoted 1,000, and l. 500, thus cl.lxxi represents 1621) is given in *BUILDER Journal*, 1863, xxi, 195; PENNY CYCLOPEDIA, s.v. Numeral characters; and other works. Some archaic numerals, in GODWIN, *English Archæologist's Handbook*, 8vo., Oxford, 1867.

NOTCH (Fr. *coche*). An indentation of a rectangular or triangular form, made in a substance—DOVETAIL NOTCH. NOTCH LEAVES, like notches from a stick, are noticed at Lincoln. by KING, *Eastern Cathedrals*, 8vo., 1862, p. 302, 314.

NOTCH BOARD (Fr. *limon*). The plank inclined to the slope of a flight of stairs, it being grooved or notched for the reception and support of the ends of the risers and treads of the steps. It is sometimes called "Bridge board". STRING.

NOTCHING. The cutting of grave stones has been so called by carvers; PINCOT, *Artificial Stone*, 8vo., 1770, p. 5.

NOTE OF A ROOM. The vibrations of a column of air giving musical notes occur at times in columns of air of vast size—such as that contained in a church or room—and in that case, when a sonorous agitation is excited by any cause, a note distinctly recognisable by a good musical ear becomes more or less clearly heard; this is known as the "note of the room", and is a matter of frequent observation. The existence of the proper note of different rooms has long been recognised, and is explained in T. R. SMITH, *Acoustics*, 12mo., Lond., 1861, p. 83-7. Every chamber, in short, has a voice; a speaker should find out the keynote of a room, and speak in it if possible; this fact opened the question whether we could improve rooms for hearing by attention to the dimensions and proportions: SCOTT RUSSELL, *Interior Forms of Buildings*, in *CIVIL ENGINEER*, etc. *Journal*, x, 82.

NÔTRE (ANDRÉ LE), born 1613 at Paris, studied under S. Vouet and C. Le Brun. He succeeded his father in the office of *intendant* of the royal gardens, and became *contrôleur* of the royal buildings and designer of gardens on a recommendation to king Louis XIV by Fouquet, for whom he had laid out the grounds of Vaux le Vicomte. Versailles and a large number of parks, gardens, etc., were committed to his care by the king and nobles of France, Holland, Italy, and England (it is said). Besides several honours, he was elected 1681 a member of the academy of architecture. He died 15th Sept. 1700 at the Tuileries, aged 87 years, and was buried in the chapel he had founded in the church of S. Roch, which contains his bust by Coisevox. A portrait of him, engraved by J. Smith after C. Maratti, was published, LAMBERT, *Hist. Litt.*, 4to., Paris, 1761, iii, 144. 3. 5. 25.

NOURRI. A few miles beyond Gebel Barkal or Mount Barkal, up the river Nile, in Egypt, and near the fourth cataract, are traces of thirty-five pyramids of small size, of soft sandstone, and badly built; only fifteen are in any kind of preservation; their size varies from 20 ft. square to 110 ft.; there are eight above 80 ft. sq. and four more above 70 ft.; their height is generally about the same as their diameter. They are all at right angles and their direction nearly the same, the axis being northwards: HOSKINS, *Travels in Ethiopia*, 4to., Lond., 1835, p. 166, with plan and view, thinks this may have been the site of the ancient capital of the province, destroyed by Sesostris, the Rameses II, in the 6th cent. B.C. CAILLIAUD, *Voyage à Méroé*, etc., fol., Paris, 1823-7.

NOVARA (the Latin NOVARIA). The principal town of the province of the same name, in Northern Italy, and situated between the rivers Agogna and Terdoppio. The bishopric was formed in the fourth century. The basilican cathedral, dedicated to the Assumption of the Virgin, consists of a west front with two towers, a nave in nearly its original state *cir.* 9th or 10th cent., and the mosaic pavement probably by Byzantine workmen; aisles and chapels beyond, all vaulted; transepts; a long chancel with a circular apse; and a detached lofty square campanile at the north-east angle of transept and chancel, terminating in a cupola. An octagonal baptistery having ancient Roman columns of white marble, and in the centre a circular Roman urn for a font, was situated at one end of an atrium or forecourt, which was covered on three sides, but the court has been lately removed to allow of a Corinthian portico being added to the west front. The edifice is given in OSTEN, *Bauwerke*, etc., fol., Darmstadt, 1846, pl. 14-16; BIANCHINI, *Il duomo e la scultura del corpo di guardia*, 8vo., Nov. 1836. There are also three parish churches, of which the collegiate basilican church of S. Gaudenzio, 16th cent., by P. Pellegrini revised by M. Bassi, is one of the finest in Lombardy; the high altar dates 1725; the large oviform cupola over the crux has outside it a double circular row of Corinthian columns; and rises higher than the lofty bell tower adjoining. S. Pietro al Rosario, formerly Dominican, was finished in 1618; there are other four suburban churches.

Several of the palaces were designed 1527-1600 by P. Tibaldi; among them the palazzo Bellini. The streets had low arcades but these are giving way to more lofty ones like those at Turin. Besides the usual public edifices, there is the new general hospital, having a cortile supported by 88 granite columns; a fine theatre; and a new *mercato* also containing the offices of the tribunal of commerce, 1817-42, by Orelli of Milan; it is one of the largest and most costly edifices of the town. The diocesan seminary has a library of 12,000 vols. A statue of Carlo Emanuele III is by Marchesi; and a broken column is a memorial to king Charles Albert. BIANCHINI, *Compendio Storico di N.*, 1828. MORBIO, *Storia di N.*, Vigevano, 1831. 14. 28. 50. 96.

NOVARA (BERTOLINI DA), see PLOTI (B.)

NOVELLA DA SAN LUCANO (AGNOLI) of Naples, studied

at Rome, and returned to Naples, where he renovated 1450 the church of S. Domenico Maggiore, removing all the Gothic work of Masuccio I. In 1470, Roberto Sanseverino, prince of Salerno, required from him a design for a very sumptuous palace. It is built of travertine, each stone made diamond pointed; was completed in ten years; and was afterwards given by Isabella Feltri della Rovere to the Jesuits. He erected the cupola (destroyed by the earthquake of 1688) to the church Gesù Nuovo; it has not been replaced. 3. 36.

NOVELLI (GIOVAN PIETRO, usually called PIETRO), born 2nd March 1603, at Monreale in Sicily, was the son of Pietro A. Novelli, a painter, under whom he studied, becoming a celebrated painter, after whose death in 1625 he studied civil and military architecture. His first work in that profession was the design, selected in competition, of the triumphal arch for the entry, 16 June 1641, of the viceroy don G. A. E. de Caprera, who gave him 1643 the appointment of government architect, and sent him to fortify Melazzo. Upon the death of V. Tedeschi, he was appointed 21st September 1644 architect to the city of Palermo, by the senate, which at the same time conferred upon him the rarely-granted freedom of the corporation. The arrangements of the cathedral, 7th April 1645, in consequence of the death of the queen of Spain, and 20th February 1647, in consequence of the death of the infante Balthasar, were made by him, as were those for the fêtes of Sta. Rosalia 1643-7. Many works are attributed to him, such as the north-west side of the porta Austriaca by G. Guerci; the four semi-circular façades of the piazza Vigliena by G. Lasso; and the marble enclosure by M. Smiriglio to the statue of Philip IV; but he probably designed the façade for the compagnia di Sta. Maria della Pace, near the porta di Termini; 1644-47, the decoration of the porta Felice, perhaps built by him, 1582-1636; and the entrance to the façade of the casa de' P. P. Olivetani. To these the front of the church of Sta. Maria Maddalena, near the porta Nuova; another church between it and the casa de' P. P. Cappuccini, with his own house in the via di Mezzomorale, are added with some doubt by GALLO, *Elogio Storico*, 4to., Palermo, 1830, 3rd edit., p. 51, who acknowledges the appearance in many other buildings of the style of architecture which Novelli introduced into his pictures, and which was, perhaps, a little less broken and distorted than that which was usual in Italy at the time; the print of his first work remains the best specimen of his art. He was shot in the arm during his attendance, 22nd August 1647, upon Pietro Branciforte, and, refusing amputation, he died on the 27th, and was buried in the church of S. Domenico. The above work by GALLO contains the portrait of Novelli and eight plates of his paintings. *J. W. P.

NOVGOROD or VELIKI NOVGOROD, great Novgorod. The capital of the government of the same name in Russia, situated on the river Volkhov, near where it issues from the lake Ilmen: a timber bridge is supported by granite pillars. It once contained 400,000 persons, and carried on an extensive trade; its riches enabled John III in 1480, after he had conquered the republic, to send to Moscow three hundred chariots laden with articles of silver and gold. The great memorial, designed 1860 by Mikeschine of Russia to commemorate the thousandth birthday (1862) of the Russian empire, has groups of figures, 12 ft. 6 in. high, representing Rurik of Rossigen, in Sweden; Vladimir, 988; Demetrius of the Don, 1380; Ivan III, 1462; Michael Fedorovitch, 1613; and Peter the great, 1721. The bas reliefs, 5 ft. high in the base, of Serdopol granite, include 107 persons who have contributed to strengthen or to civilise Russia; this is about 28 ft. diam.; the height of the whole memorial is 50 ft. It cost about £75,000. A view is given in *BUILDER Journal*, 1863, xxi, 98-9; and another of the inauguration, in *ILLUSTRATED TIMES*, 1862, p. 431-2.

The part of the city on the left bank is surrounded by a battlemented wall having many towers, two of which, dating 1190, are given in KIPRIANOFF, pl. 13 and 14; and has two

gates. It contains the kremlin, commenced 1037, within which is the cathedral dedicated to Sta. Sophia, built after the model of that at Constantinople; it has five domes. It was founded 1045, executed by Greek workmen, and is a perfect specimen of the Byzantine style; a view is given in KIPRIANOFF, *L'Arch. en Russie*, 8vo., S. Peters., 1864, p. 15, pl. 10; the first timber church had thirteen domes. The bronze doors with reliefs, date 1160 (OTTE, *Handbuch*, 8vo., Leipzig, 1854, 296-9, 300-4). There are other sixty-one churches, and several monasteries. The portion of the city on the right bank occupies a large extent of surface, now chiefly of huts, the only building of importance being the governor's residence. A timber church near the town, is said to have been built in the reign of Ivan IV (1533-54); a view in KIPRIANOFF, pl. 26.

LIZAKEVITZ, *Histoire de Nowgorod*, 8vo., Copenh., 1771 (rare). CHAPPE D'AUTEROCHÉ, *Voyage*, fol., Paris, 1768, i. F. VON ADELUNG, *Die Korssbüschen Thieren*, etc., 4to., Berlin, 1823, gives the gate; and *Kathedral Kirche*, 4to., Berlin, 1823. MEYER, *Darstellung*, etc., 8vo., 1829. BREMNER, *Russia*, 8vo., Lond., 1839, ii, p. 11. VENABLES, *Domestic Scenes*, 8vo., Lond., 1839, p. 30, who gives a curious Gothic church at Krasnoe near the town, with five domes. COCHRANE, *Russia*, 8vo., Lond., 1824, i, p. 73. DEMIDOFF, *Voy. Pitt.*, fol., Paris, 1848, pl. 25, gives a church of S. Paul in the environs; pl. 31, a view of the fortress and the timber bridge; pl. 32, apse of the cathedral; pl. 32, interior of the fortress; and pl. 33, monastery of the Dames de l'Annonciation. 50.

NOVI (FRANCESCO DA), pupil of Rocco Lurago, built the church of S. Bernardo at Genoa, perhaps no longer existing; and another to the same saint at Albano, near that city. 3.

NOVIODUNUM. The ancient name of NEVERS, in France.

NOVIOMAGUS. The ancient name of LISIEUX, NOYON, and SPEYER.

NOVOGEORGIEVSK, called MODLIN before 1831. A town in Russian Poland, twelve miles below Warsaw, situated at the confluence of the river Narew with the Vistula. It has one of the strongest fortresses in Europe. The Russian cathedral dedicated to S. Alexandria was designed before 1845, by J. Gay, of France. It is a square of 85 ft., forming internally a Greek cross surrounded by the customary five domes. A plan, elevation, and section are given in the CIVIL ENGINEER, etc. *Journal*, viii, 301; from the ALLGEMEINE BAUZEITUNG, 1845, pl. 660-4. He also designed 1835-40 the extensive granary with a bomb-proof floor under, pierced on both sides; its length is about 600 Polish ft., 100 ft. in width and 90 ft. in height: given in the same *Journal*, 1850, xiii, 241, from the same German work, 1844, pl. 579-84. 28.

NOVOSIELSKI (MICHAEL), born about 1747, commenced 1786 the forty-four houses called Michael's Place, Brompton, as a building speculation; but the shells remained for many years unfinished; Nos. 43 and 44, the two last, were not built in 1811. His widow for some years after his death at Ramsgate, 8th April 1795, aged 48 years, occupied No. 13. He designed, after the fire of 27th June 1789, the opera house in the Haymarket, then the largest theatre in Europe except La Scala at Milan: the first stone was laid 3rd April 1790. He erected a small portion of the façade in Portland stone towards the Haymarket, in the Italian style, consisting of a superstructure of the Doric order, elevated on an arched and rusticated basement. This was removed for the casings and alterations by J. Nash and G. Repton, 1816-18, during the improvements of the locality. It was burnt Dec. 1867. In 1794 he exhibited the drawings of this edifice at the Royal Academy of Arts. The house at the east corner of Engine Street, in Piccadilly, was designed by him for the earl of Barrymore, after whose death it became the Pulteney and Russian Imperial hotel; it was pulled down to the under-side of the windows of the ground floor, and rebuilt 1851 for the marquis of Hertford; the general design of the exterior being retained: BUILDER *Journal*, ix, 227-35. BRITTON and PUGIN,

ARCH. PUB. SOC.

Edifices of London, 1825, i, 72, with plates. CROKER, *Walk to Fulham*, 8vo., 1860, p. 43, 50. GENTLEMAN'S MAGAZINE, lxx, 616. BOADEN, *Life of Kemble*, ii, 141.

NOY, NOYE, NOYEN, OY, and OYEN (SÉBASTIEN VAN), also DOYA and DOJA (SEBASTIAAN); called d'OIA or d'OYA by the Italians, was born 1553 at Utrecht, and studied at Rome. He designed 1559 the fine hôtel for the cardinal Granvelle or Grandvella, at Bruxelles, given in GORTHEBUE, *Choix des Mons.*, fol., Ghent, 1827, p. 11, 21, 57; pl. 30-2: the site is now occupied by the university, but one of its wings, used (1859) as the lower middle school, is the finest building of the Renaissance style in Brussels; it was nearly destroyed by a fire, 12th August 1825. Van Noy's drawings of the baths of Diocletian at Rome, were engraved by Jerome Cock, and published at Antwerp 1558 in a roll 43 ft. long; three copies only exist at Rome and Paris. He became architect to the emperors Charles V and Philippe II, and was employed in fortifying Philippeville in 1553, Hesdin in 1554, and Charlemont in 1555. He died 5th June 1557, at Bruxelles, "at the age of thirty, but his works are not known", according to VASARI, *Lives*, edit. 1852, p. 463: and was buried in the church of S. Gudule. COMMISSION ROYALE D'HISTOIRE, *Bulletins*, 8vo., Brux., 1849, xiv, 51, gives 5th June, but 15th is in the inscription on p. 546. 3. 101.

NOYER (. . . DU), see NOIER.

NOYON (the Latin NOVIODUNUM SUSSIONUM and NOVIOMAGUS). A town in the department of Oise in France, situated on the river Verre. The see was removed from S. Quentin in the fifth century, but it no longer exists. The former cathedral is dedicated to Notre Dame. A Michele Mansarto, "cavaliero Romano" is said to have been employed in its construction about 989. It was burnt 1131; the rebuilding was commenced 1150 at the choir and transept, and the nave completed about the end of the century, the whole on a uniform plan. The two towers are 200 ft. high. In 1293, a fourth fire burnt the timber work and did considerable damage, necessitating a few additions and alterations; others were made after the wars of the sixteenth century; it is almost in its original form. The chapter house is of the 13th, and five bays of the cloister are of the fourteenth century; of which period is the porch. This edifice is 299 ft. 8 in. long inside; the width of the nave 33 ft. 6 in. between the centres of the columns; the aisles each 15 ft. 8 in.; and the total width 64 ft. 10 in. The total length outside, including the porch, is 338 ft. 4 in.; the height to the vaulting 74 ft. 6 in.; of the aisles 28 ft. 9 in.; of those of the choir 26 ft. 3 in.; and that of the chapels 26 ft. 7 in. (RAMÉE). A plan is given in VIOLET-LE-DUC, *Dict.*, s.v. Cathédrale, 298-308, who notices that the church of S. Denis, erected by abbot Suger, and this edifice, seem to have been erected by the same workmen, for the same construction, profiles, ornaments, etc., are seen in both edifices. "Noyon cathedral is the finest monument of architecture of the period of the transition, the grandest and most complete", RAMÉE, ii, p. 178-88. It was commenced to be restored by the French Government in 1840. "One of the first and purest of all French cathedrals, essentially religious in its character and beautiful in its charming simplicity of outline and detail"; EDIS, in BUILDER *Journal*, 1865, xxiii, 130; who in BUILDER NEWS *Journal*, 1865, p. 750, gives the lady chapel, and 1866, p. 66, two plates of other portions. There are also an ancient episcopal palace; a seminary for the priesthood; and an hospital.

RAMÉE, *Monographie de l'église N. D.*, fol., and text 4to. by VITET, Paris, 1845; copied into ALLGEMEINE BAUZEITUNG, for 1852, pl. 446-57. MOYEN AGE PITTORESQUE, west door, pl. 104. RAMÉE, *Hist. Gen. de l'Arch.*, 8vo., Paris, 1843, ii, 178-188. NODIER and TAYLOR, *Picardie*, fol., Paris, 1835, 48, iii, gives plates of the old hôtel de ville, its court with details, the old house of justice and bishop's library, the cathedral with plans, elevation, and sections, and details of the

chapel de N. D. de Bon Secours; three coffers, etc., of 11th, 13th, and 14th cents.; the chapter house, and elevation of the cloisters; that of the library is given in DALY, *Revue Générale*, 4to., Paris, 1856, xiv, pl. 8. Several drawings of details by W. Hodgkinson are in the library of the Inst. of Brit. Archts. BOUET, *Remarks on the Cathedral*, in DE CAUMONT, *Bulletin Mont.*, 8vo., Caen, 1868, 4th series, iv, 430-9.

In the vicinity is the château de Pierrefonds, built 1390 by Louis duke of Orleans, which, dismantled 1616 by Louis XIII, formed one of the most picturesque ruins of the country, until completely restored 1859-72 by Viollet-le-duc, at a cost of £200,000, who published a pamphlet upon the building. SPIERS, *On the Chateau*, etc., read at Royal Inst. of Brit. Archts., *Sessional Papers*, 1873-74, p. 54-65. The castle forms the subject of a number of illustrations in VIOULET-LE-duc, *Dict. de l'Arch.* ATHENÆUM *Journal*, No. 2190, 1869, p. 501.

NUBIA AND ETHIOPIA; ARCHITECTURE OF. The ancient general name for the regions south of Egypt was Ethiopia above Egypt, of which the kingdom of Meroë formed an important part. It extends from Philæ, at the first cataract, to the southern limit of Dongolah, nearly 600 miles along the river. Remains of ancient edifices of the Egyptian style occur throughout this distance, but chiefly below Dongolah. as the temples at Dabod, the ancient PAREMBOLE; at Gartasse; at Tefah; the temple at KALABSHÉH, the ancient Talmis, the largest in Nubia, which was begun by Augustus (B.C. 45—A.D. 14) on the site of one by Thothmes III (B.C. 1495-56), it was apparently thrown down before completion; it has bold proto-Doric columns in its vestibule: an unfinished temple at DENDOUR, of the time of Augustus; a rock-cut temple at Gerf Hossayn, the ancient Tutzi, of the time of Rameses II; and another of the same period with an avenue of sphinxes, and a rock-cut adytum; at Girsheh; the temple at Dakka or PSELGIS; at Maharaga; at Essabua; at Amada, a temple of Amenoph II (B.C. 1456 and later); nearly opposite on the east bank is Dayr or DERR, or Derri, the capital of Nubia, where is a rock-cut temple of the date of Rameses II (B.C. 1355); at Ibreen some painted grottoes by Thothmes I and III; and later at Ipsamboul or ABOO SIMBEL (and woodcut) the two rock-cut temples having colossal sitting statues, the finest out of Thebes, and of the period of Rameses II; at Balagne; at Ser ak Scheh; and near Diggem, concluding at the second cataract. These are all comprised in GAU, *Nubie*, fol., Paris, 1822-23, pl. 1-64. On pl. 53 he gives two Coptic churches at Ibrim, one, 57 ft. long, "shows the peculiarity of the apse being internal: it is built with something of the solidity of the Egyptian edifices among which it stands"; FEROUSSON, *History*, p. 359.

In Dongolah, which had been a Christian country previous to the fourteenth century, are some prostrate granite figures about 26 ft. in length, in the isle of Argo, which is 30 miles long: the monuments at Soleb; the temples and pyramids of MOUNT BARKAL (the ancient Napata); the pyramids at Nourri, the finest monuments of Upper Nubia; the temples at Amara, El Mesaourah, and Semneh, complete the list.

Modern Nubia includes the above, as well as the ancient MEROE in Ethiopia (with its pyramids), the modern capital of which is Shendy, extending to the confluence of the Blue and White rivers; and Sennaar, still further up the country. NAGA is another place near Shendy containing many monuments. "No one can take the most rapid glance at Ethiopian monuments without perceiving their origin; and deciding at once that the Ethiopians derived nearly everything in architecture and religion from Egypt", WILKINSON, *Arch. of Ancient Egypt*, 8vo. and fol., Lond., 1850, p. 136; though some other writers have expressed a contrary opinion: Ethiopian art is, says LEPSIUS, *Discoveries*, 1853, p. 248, only a later branch of the Egyptian. It does not begin under native rulers until Tahraka (about B.C. 695-75 or 714-698).

FEROUSSON, *History*, 1865, i, 112, notices that while all the excavations in Egypt proper are tombs, those in Nubia are temples, and no tombs of importance are to be found anywhere, tending to show that if there was any connection between Africa and India, it was with the provinces in the upper part of the valley of the Nile, and not with Egypt. There Nubian temples are copies of structural buildings; at Essabua, Girsheh, and Dendour, also at Gibel Barkal in the kingdom of Meroë, the cells have been excavated but the courts and propylons are built, a combination never found in Egypt.

Description de l'Egypte, publié par l'ordre du gouvernement, fol., Paris, 1802. CHAMPOLLION LE JEUNE, *Monts. de l'Egypte et de Nubie*, fol., Paris, 1835. DENON, *Voyage dans la haute et la basse Egypte*, fol., Paris, 1802. BURCKHARDT, *Travels in Nubia*, 4to., Lond., 1819-21, which contains MAK-RIZI, *History of the Sultans of Egypt*, written in the 14th cent. BELZONI, *Narrative*, 8vo. and fol., Lond., 1821. WADINGTON and HANBURY, *Visit to Ethiopia*, 4to., 1822. HOSKINS, *Ethiopia*, 4to., 1835. CAILLIAUD, *Voyage à Meroë*, fol., Paris, 1823. LENOIR, *Musée des Antiquités Egyptiennes*, 1841. RÜPPEL, *Travels to Nubia*, etc. ROSELIINI, *I monumenti dell' Egitto*, etc., 8vo. and fol., Pisa, 1832-43. RIFAUT, *Voyage en Egypte*, etc., 5 vols., 8vo. and fol. CADALVÈNE ET DE BREUVÈRE, *L'Egypte*, etc., 8vo. and fol., 1836. CHERUBINI, *La Nubie*, 8vo., Paris, 1840. Society for Diffusion of Useful Knowledge, *Egyptian Antig.*, 8vo., 1832-40. HOREAU, *Panorama d'Egypte et de Nubie*, fol., Paris, 1840. RAMÉE, *Manuel de l'histoire générale de l'Arch.*, 12mo., Paris, 1843. LEPSIUS, *Denkmäler aus Aegypten und Aethiopien*, fol., Berlin, 1849-59. DU CAMP, *Egypte, Nubie*, etc., 125 photos., fol., Paris, 1852-53. ROBERTS, *Egypt and Nubia*, fol., Lond., 1842-50. FRITH, *Upper Egypt and Ethiopia*, 37 photos., 1857 (?). MARIETTE, *Monuments Divers*, fol., 1872.

NUBILARIUM. In Roman farmyards there was a huge shed or half enclosed barn of sufficient dimensions to contain the whole crop of corn, which was dried therein in unfavourable weather before being thrashed, and into which it was hurriedly conveyed for shelter when the harvest work was interrupted by any sudden storm.

NUCERIA ALFATERNA. The ancient name of NOCERA, in Southern Italy.

NUCLEUS. The Latin name for the second or finishing coat of a concrete floor, or to receive a finishing material; GRÆCINICUM OPUS.

NUDDY or NADI. The term used in Hindustan for a river.

NUEL, see NEWEL.

NUERNBERG (Lat. and Ital., Norimberga; Dutch, Neurenburg; Engl. and Fr., Nuremberg). A town in Bavaria, which after being made free in 1427, became the greatest and most wealthy of all the free imperial cities in Germany. It is situated on the river Pegnitz, over which are numerous bridges of stone and timber, and a suspension bridge built 1824. It is in the form of a square, surrounded by old walls flanked with a great number of towers, and by a moat over 100 ft. wide and 50 ft. deep, having a circuit exceeding three miles. The arched gateways are flanked by four massive cylindrical watch towers; and the narrow and irregular streets are lined with quaint gable-faced houses, standing as they were originally built several centuries since. The characteristic feature of the city is a venerable air of antiquity. The *reichs-schloss* or *reichs-feste* was probably erected in the tenth century; the exterior has not been renovated, but buildings were erected 1520 in the interior. It now contains a picture gallery of ten rooms. The well is said to be 536 ft. deep. The chapel is of two stories; the lower or S. Margaret's dates 1024-39, the upper or the Ottomar is later, and has a square east end; another writer states the end is semicircular with a tower over it. The *Freiungkapelle* is now used for curiosities. COCKERELL noted

that the church built 1158 in the castle, and the Frauenkirche probably of later date, are exact illustrations of the temple in *antis* as given in the edition of VIRRVIVUS, by Cesariano, fol., Como, 1521, iii, 52. The largest of the numerous public squares, the *Hauptmarkt*, has a fountain 60 ft. high, similar in design to the Eleanor crosses; it dates 1355-62, and is by Geo. and Fred. Rupprecht, Sebald Schonhofer being sculptor; the railing at the base 1586 is by Paul Kón; it was restored 1821-24 under the direction of A. Reindel, director of the school of arts. In the Goose market is a bronze fountain, with a peasant having two geese under his arm spouting water, by Lawenwolf, who also designed another in the court of the rathhaus. A bronze fountain is by Wurzelbauer 1580. A statue of Melancthon 1826 is by Burgschmiet. Ranges of warehouses, used when the chief trade of the East passed through this channel into Western Europe, having vast high roofs, gables, cranes, and pointed doorways, are given in KALLENBACH, under 1540-90; and two other gables 1510-30. Close under the castle is A. Dürer's house; the exterior is untouched, but the interior has had various modifications. It is now town property, and used as a place of exhibition (*BUILDING NEWS Journal*, 1875, xxix, 696. The *Nassauerhaus*, of red sandstone, illustrates the domestic architecture of 1850; KALLENBACH shows the oriel.

S. Sebaldkirche (Transitional or First Pointed) *cir.* 1215, has a nave and aisles of equal height and width, both vaulted; it has a western apse; the south tower was begun 1300, and the northern 1345. The choir and the transepts, which are very broad and all much more lofty than the nave, were erected 1361-77 (KALLENBACH); its windows are 50 ft. high and not quite 8 ft. wide. There is a richly carved portal; a fine bronze font, dating 1361; a massive crucifix of bronze, one of the earliest specimens of Nürnberg art; and the shrine of S. Sebald 1492 (WEBB, 1508-19), executed in bronze by Peter Vischer and his five sons, who all worked upon it for thirteen years and adorned it with nearly one hundred figures, among which those of the Apostles are celebrated for their size and beauty. A cast is in the South Kensington museum; it is 15 ft. high, 8 ft. 7 in. long, and 4 ft. 8 in. wide. The door (iron) to the sacristy dating 1400 *cir.* has coats of arms in diaper, in low relief. The glass dates 1479, 1493, and one 1515 very inferior. Two capitals are given in *Illustrations*, 1856-57, pt. 2. *Lorenzkirche*; the nave *cir.* 1200 with low aisles has richly clustered pillars, and was enlarged 1403; the two massive west towers (KALLENBACH), with a fine porch and a round window about 30 ft. in diam. date 1274-80 (KALLENBACH); GAILHABAUD, *Mons.*, 4to., 1950, iii, gives the centre part of the façade. The rich choir with aisles of equal height, 1459-77, are by Hans Bauer and C. Heinzelmann from a design by C. Roriczer.

The church is 322 ft. long by 104 ft. wide; the roof over the choir is 100 ft. span and 70 ft. high, divided into several stories or stages, each 12 ft. high. The spire of the north tower, then 300 ft. high, was destroyed by lightning January 1865. The glass is most gorgeous, the Wolkamerfenster having European fame. The high altar and pulpit are by K. A. von Heidehoff. The sacramentshäuschen 1445-50, by A. Krafft, is 64 ft. high of white stone; he was paid 770 gulden, or about £65 to £70: it is supported by crouching figures of himself and two pupils. There is much ancient furniture. The *Frauenkirche*, 1355-61, by G. and F. Rupprecht, has a peculiar west front, three aisles, and an enclosed half octagonal choir, all vaulted and richly coloured; the sculptures are by S. Schonhofer. The last bay is occupied by two original timber galleries. The Pergensdorfer tomb 1500 is one of the chief works of Krafft. The church was restored by Heidehoff, who also restored 1824-25 the *Jacobikirche*, founded 1283. The *Ægidienkirche* (Italian), burnt 1696, rebuilt 1711-18, retains three chapels, 13th and 14th cents. [of S. Wolfgang of Eucharius (late Romanesque), and Tetzl (early

Third Pointed), are mentioned by WEBB], one was founded by Conrad III for some Scotch Benedictine monks. S. Clara, a nunnery church (late Pointed), desecrated, has paintings on glass dating 1278. The Holy Cross is of early late Pointed date, and built by the Haller family. The *Spitalkirche* or church of the Holy Ghost (Pointed) has windows of good tracery. Some of the Protestant churches in Nuernberg still retain the altars, fittings, statues, crosses, and other fittings as they were left by the Roman Catholics at the time of the Reformation. The *Kunstgewerbschule*, a museum of casts, was a late Pointed chapel having wreathed columns and vaulted with pendants. The Carthusian convent, founded 1383, includes a complete set of buildings; the church, an excellent specimen of German Pointed architecture, has a fine transept and late Pointed west window (WEBB), and a cloister 250 ft. long; the whole is now used as the Germanic museum of mediæval antiquities. The parsonage of S. Sebald's has a fine oriel window. The chapel of S. Maurice (late Pointed) restored 1829 by Heidehoff, is now a picture gallery. The former Dominican church contains the city library of over 20,000 vols. The Augustine monastery was built 1485-88, by Hans Beer. The seven stations on the Via crucis or road to the *friedhof* or cemetery of S. John, are by A. Krafft, about 1430-1507. It is full of tombs, among them that of A. Dürer, and others of great antiquity; the *Holzschühler* mortuary chapel dates 1374; the chapel of St. John is Flamboyant in style.

Of the public buildings, the *rathhaus* is of three floors, 275 ft. long, with a large hall 76 ft. by 28 ft. (also stated as 80 ft. by 60 ft., and 130 ft. by 40 ft.), with a timber coved ceiling. It was built 1332-40 by P. Gros, and portions may still be seen in the inner quadrangle and in a back street; it was enlarged 1514, restored 1521-2 by J. Boehaim (Jeannot Boehaim the elder), and greatly rebuilt 1616-19 in the Italian style by E. K. Holzschuher. Old views of this edifice are given in HEIDELOFF, *Ornamentik*, 4to., Nur., 1847, pl. 6 and 7. The gymnasium was opened 1526. 14. 50. 92.

MAINBERGER, *Eine Woche in N.*, 8vo., Nur., 1837; 1844; 1856, has a plan. POPPEL, *Malerische Ansichten aus N.*, fol., Nur., 1834-41. RETTBERG, *Gesch. von N.*, fol., Stutt., 1845; N. *Kunstleben*, 8vo., Stutt., 1854. GRAEFF, *Reisen*, Ten views, eng. by Kraus, fol., 1681-1701. *Nürnbergischen Prospektus*, 1716, gives views. OSTERHAUSEN, *Nürnbergisches Taschenbuch*, 8vo., 1829; *Nürnbergischer Jahrbücher*. WILDER, *Der Schöne Brunnen zu N.*, 8vo., 1824. HEIDELOFF, *Nürnbergers Baudenkmale*, fol., 1838-43. LEPSIUS, *Ueber des Alterthums*, 4to., 1822. KALLENBACH, *Die Baukunst des Deutschen Mittel. Baukunst*, fol., Munich, 1847. WILDER and GEISSLER, *Ansicht von N.*, *cir.* 1847. VOLCAMMER, *N. Hesperides* (views in environs), N., 1807. HAGEN (E. A.), *Norica*, 8vo., Breslau, 1829, transl., 16mo., Lond., 1851. HAGEN (F. H. von der), *Denkmale des Mittelalters*, 8vo., Berlin, 1824. WANDERER, *Adam Krafft et son école*, 1490-1507, fol., 1869, 60 subjects. BRANDLING, *Views of Nur.*, fol., Lond., 1857 (chromos). N. SHAW, *Arch. Sketches*, fol., 1858. EASTLAKE, paper read before Architectural Association, 1865, in *BUILDING NEWS Journal*, xii, 387, 403. RACZYNSKI, *Modern Art*, 4to. and fol., Paris, 1836, ii, chap. 13. WEBB, *Ecclesiology*, 8vo., Lond., 1848. PFISTER, *Handbuch—der Stadt N.*, etc., 8vo., N., 1841. *Allemagne, Mont. et Pittoresque*. 7.

Illustrations: CHAMFER STOP; CANDELABRUM; CEILING; CORBEL; CROCKET; CROSS; FAÇADE; GABLE; GRILLE. Lock and ring handle from the ancient convent of Landau, now the school of arts (pl. 2); ironwork in house of M. Petersen, 1590 (pl. 20); ironwork from Albert Dürer's house (pl. 41); knocker plate from the German museum (pl. 72); ornaments of the gates of the schone Brunnen (pl. 82); are given in HIEFNER ALTENEK, *Serrurerie*, 4to., Paris, 1869.

At Altenfurt, in the environs, are a small chapel with a

domical roof, dated 700—800 in KALLENBACH: and the kloster capelle at Heilsbronn, dated 1200-15 in the same work.

NUGGER or NAGAR. The term used in India for a city.

NUISANCE. The Nuisances Removal and Diseases Prevention Acts of 1855, 18 and 19 Vict., cap. 116 and 121; and Amendment Act, 1860, 23 and 24 Vict., cap. 77, by W. G. LUMLEY, with introduction, notes, index, and appendix. GIBBONS, *Laws of Dilapidations and Nuisances*, 8vo., 1849. YOOB, *Essay on Waste, Nuisance, and Trespass*, 8vo., 1863. The Public Health Act, 1876.

NULAMPALLAH. A dark brown coloured wood of Travancore, East India; from 2 to 4 ft. in circumference, and 30 ft. long, used for common houses and carts. 71.

NULLAH, properly NALA. The name used in Hindustan for a brook, a watercourse, or the channel of a torrent.

NUMERAL, see LETTER.

NUMERICAL PROPORTION, see PROPORTION.

NUMIDIAN MARBLE: see GIALLO ANTICO; HYMETTIAN MARBLE.

NUMISIUS. As stated in STARKE, *Travels in Europe*, 1839, p. 295, "the theatre at Herculaneum appears to have been built about the same time as that at Verona, after the designs of Numisius". His name is preserved in an inscription on the former building. VITRUVIUS, *Treatise*, b. 1, Intro., says, "Hence, together with M. Aurelius, P. Numisius, and Cn. Cornelius, I have been appointed to, and receive the emoluments arising from the care of, the various engines of war, which you (the emperor Augustus) assigned to me on the recommendation of your sister". GWILT, in his translation, 1826, calls him an architect. CICERO, *ad Q. Fr.*, ii, 2, sec. 1, speaks of a plan of a house or villa designed by one Numisius. 59.

NUMISMATICS. Of or pertaining to, relating to, or concerning, money, coins and medals. ANGELONI, *Historia Augusta—a Costantino il Magno* (the medallic history of Ancient Rome), fol., Roma, 1641; 1685. D'AILLY, *Recherches sur la monnaie Romaine depuis son origine jusqu'à la mort d'Auguste*, 4 vols., 4to., Lyons, 1866. DONALDSON, *Architectura Numismatica, or Architectural Medals of Classical Antiquity*, 8vo., Lond., 1859. MIONNET, *Description des Médailles Ant. Grecque et Romaine*, 6 vols., 8vo., Paris, 1806-13. VISCONTI ET MONGEZ, *Iconographie Romaine*, fol., Paris, 1811-29. MARSDEN, *Numismata Orientalia*, 4to., London, 1825. ECKHEL, *Doctrina Nummorum Veterum*, 9 vols., 4to., Vienna, 1792-8. Also the works of COHEN, HENRIEU; DE SAULCY; CADALVÈNE; DE LUYNES; LELEWEL; MILLINGEN; VAILLANT; RASCHE; and others. GREEN, *A Numismatic Atlas of Ancient History*, series of 21 pl. of Grecian coins, fol., Lond., 1829. *Numismatic Journal*, 2 vols., 8vo., Lond., 1836-8; and *Chronicle*, in progress. NUMISMATIC SOCIETY, *Proceedings*, 1837, etc. MEDAL.

NUMMULITE. An extinct genus of foraminiferous Acrites, of a thin lenticular shape, divided internally into small chambers. It derives its name from the similarity of its appearance to masses of coins or money. They occur so abundantly in some parts of the chalk formation, that the name of nummulitic limestone is given to the strata so characterised. This nummulitic formation is often of great thickness, and contains the fossil in incredible abundance. It belongs to the middle division of the lower tertiary and ranging more widely than any known tertiary rock. From China across to the mouths of the Indus, throughout eastern Bengal, in Persia, largely in the Carpathian and Alpine mountain masses, in south of France to the Pyrenees, to south of Spain, and the north of Africa. The foraminiferous fossils of the London clay are doubtless of the same date. In western Thibet they have been found 16,500 ft. above the level of the sea. BRANDE, *Dict.*, 8vo. 1875. In the presidency of Bombay, where it is also called Forebunder stone, from the place whence it comes, it appears like a very fine grained variety of stone similar to

Bath oolite. STRABO alleges the nummulitic limestone found in the vicinity of the pyramids to be the petrified residue of the lentils brought there by the workmen.

NUNES (PEDRO), of Santarem, see EANES (M.)

NUNI of Fano, erected the library at Cesena in Italy in the fifteenth century; it is engraved in MUCCIOLI, *Catalogus*, fol., Cesena, 1780.

NUNNERY. A name derived from the Latin *nonna*, *nonnana*, or *nonnanis*, terms first used for penitents, and afterwards for female devotees among Roman Catholics who seclude themselves in religious communities. Each community of nuns was governed by an abbess or prioress, and the building occupied by nuns was also called a convent, as that for the monks was termed a monastery. The Saxon word *MYNCHERIE* was in England occasionally applied to a nunnery.

In England there remain five nunnery churches of the Benedictine order; at Jesus college at Cambridge, Romsey, and S. Helen's, Bishopsgate; one of smaller dimensions at Minster, in the isle of Sheppey, where the parishioners occupied one aisle divided from the rest of the church; and at Easebourne, Sussex, where the conventual buildings are tolerably perfect. S. Radegund's, Poitiers, founded 567, was the first French nunnery. The Béguines were founded by S. Begga, *cir.* 698, under the Augustine rule; WALCOTT, *Sacred Ecclesiology*, 8vo., Lond., 1868.

The arrangements of nunnery churches are not often specially referred to, but many of those in Italy are described in WEBB, *Cont. Ecclesiology*, 8vo., Lond., 1848. He notices the grilles, grated galleries, etc., at the church of S. Paolo, at Milan, built before 1594; S. Pietro at Pistoia, erected 1263; Sta. Maria Maddalena at Perugia; and at Rome, the churches of S. Antonio Abbato, a Camaldolese nunnery; S. Cecilia for Benedictines; S. Lorenzo in Pane e Perna for Franciscans; and at S. Pudenziana; S. Maria della Vittoria for Discalceat Carmelites; SS. Quattro Coronati; and SS. Trinità dei Monti, a celebrated church of the Renaissance period.

As the triforium in Westminster abbey church is supposed to have been occupied by the nuns of Kilburn, when they visited the abbey to which their house was subordinate, the term nunnery has been applied to it; hence the reason perhaps for some modern writers calling the triforium of a large church a nunnery. The nuns' choir in some buildings was placed in the triforium. 19.

NUNZIATA or DELL' ANNUNZIATA, see TOTO (A.)

NUORO (the Latin AUGURUM). A town in the island of Sardinia. The old Pisan cathedral, built 1025-1320, has been replaced by a modern one. There are several minor churches, a monastery, and other usual buildings. A prison has been lately erected. 28. 50.

NUREMBERG, see NUERNBERG.

NURHAG. The anglicised form of the names NORAGA, NURACU, and NURAGGO, given in Sardinia to more than three thousand erections, which are certainly older than the Roman conquest, 259-176 B.C., of the island, but which have not yet had their origin determined, even by DELLA MARMORA, *Voyage en Sardaigne*, 8vo., Turin, 1839-60, from whose second or archaeological volume, the following abstract has been made. "The nurhags occupy insulated sites upon the mountains, and artificial mounds in the flat country; at present they resemble towers which have the form of a truncated cone, but originally that central mass was in many cases surrounded by circular walls, and in others by smaller towers: nurhags of equal size are frequently found in pairs, in which case they are sometimes connected by a wall. Their masonry always consists of dry horizontal courses of unwrought blocks; the stones on the top are less bulky than those below, where some are said to measure 100 cubic feet each. In height the towers vary from 30 to 60 ft., and in diameter at the base from 35 to 100 ft.; the interior is divided into two or three stories, each consisting of a conical chamber with niches in the walls.

Any man entering the lowest chamber must crawl on hands and knees to pass through the doorway which, in the majority, faces more or less the south; there is a passage in the thickness of the wall, to the upper part, and this ascent is lighted; but there are no windows to the chambers. A Roman aqueduct rises upon a ruined nurhag at Pula, near Cagliari.

The following examples, included amongst those which are most accessible (if still spared from the destruction caused by the general treatment of nurhags as quarries), deserve special attention. The Nuracu Majori, near Tempio, takes its name from its great size; the base of the N. Ortu, near Iglesias, remains to show the large dimensions of the original monument; and the central cone of each of the Tres Nuraghes near Arcidano, had an outer circuit of greater extent than most others. N. Alva, near Nulvi, has one of its sides quite perpendicular; the N. Nieddu, so called from its black colour (being built of volcanic material), at Ploaghe, has its two stories well preserved, and is easy of access, although the entrance is scarcely 24 ins. high: that of S. Antino, near Torralba, contains three stories; although the entrance is encumbered with rubbish, there is no difficulty in getting into the passage, which runs into the spiral staircase; this nurhag is placed on a triangular basement, having a corridor on each side to the conical chamber at each angle: the principal cone of its neighbour, the N. Ois, is flanked on the east and south by three smaller ones connected with it by a kind of terrace. At Sta. Barbara, near Macomer, is a nurhag remarkable for its almost square form, and for the four smaller cones by which it is surrounded: about five miles to the west of Macomer is a well-preserved nurhag, in which some idols were discovered; at its base are six conical stones, each 54 ins. high, called "tamuli", three of which have a pair of paps in relief: and near Pauli-latino, besides several "giants' tombs" (cromlechs), are three conical columns which have three and six elliptical cavities that penetrate to the axes of the cones, instead of female breasts like those just mentioned. Similar constructions occur in Malta; also in the Balearic islands, where they are termed "talayots": there seems to be some affinity between them and one class of the DUNES of Scotland and the CLOCHANS or cloghans as well as the round towers of Ireland. In Sardinia, although there are more than twenty on the promontory of Sinis, many near Nulvi, still more about Isili, and upwards of two hundred round Bolotana, the environs of Macomer offer the richest harvest to the archaeologist. WARING, *Stone Monuments*, fol., Lond., 1870, pl. 5 and 6, gives examples.

* J. W. P.

NÜRNBERG, or NUREMBERG, see NUERNBERG.

NURSERY. The rooms set apart for the accommodation of children and their attendants. "The nursery" is noticed in the Ewelme Inventory of 1466; and "nursery and maids' closet adjoining" at Hengrave hall, Suffolk, 1538. The smallest modern requirements may be presumed to be a day room and a sleeping room, the sizes of which must be determined by the number of the occupants, the average of which may be taken at three children and a nurse. The night nursery should be carefully planned for separate beds; it should have a cheerful morning aspect, and a comfortable fireside in case of sickness. Good sized cupboards are indispensable. A bath and washbasin fixed in some convenient adjunct is desirable, or an attached bath room with a water closet. The day nursery should have all the characteristics of a cheerful sitting room, and be of sufficient dimensions to contain wardrobes. Where a nursery scullery can be had, it should open out from the day nursery, and contain a fireplace, sink, closets, and shelving. In all cases the nurse in charge will sleep in the night nursery, but in superior houses a nurse's room must be also provided, opening out of the night nursery. The most usual position for the nursery in a good house is at the point where the family sleeping rooms and the servants' rooms meet—that is, at the back staircase on the first floor. This affords easy communication with the grounds and to the basement offices. The

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whole suite of rooms ought to be self-enclosed: and if attainable, in a wing of the house, and in close proximity to the private apartments of the lady of the house. A good nursery suite may be converted into a superior suite for guests; a spare room near the nursery may at times be useful in the capacity of a stranger's nursery, or in that of a sick room; KERR, *The Gentleman's House*, 3rd edit., 8vo., Lond., 1871, p. 165.

NUSSDORFER (Fr.), was employed on the cathedral at Königsberg 1531-47, being in the service of duke Albrecht (1525-68) of Prussia.

NUT. A block of iron pierced with a cylindrical hole throughout which a spiral groove is formed, corresponding with the worm on the end of the bolt. After the bolt is passed through the material to be secured, the nut is screwed on; sometimes where timber is used, an iron plate, commonly called a "washer", is first put on so that the action of the nut shall not hurt the timber; it also gives a wider hold. Besides the table of sizes of nuts given *s.v.* BOLT, others will be found in TEMPLETON, *Workshop Companion*, 109; and his *Millwrights' Companion*, 10th edition, 154.

A self-acting nut-cutting machine by Messrs. Nasmyth, Gaskell, and Co., is given in BUCHANAN, *Millwork*, 8vo. and fol., Lond., 1841, pl. 39, p. 443; and Macleae and March's machine to cut square and hexagonal shaped nuts, in *Suppl.*, 1842, pl. 5 and 6, p. 9. A steam machine was invented about 1833 for manufacturing iron nuts for bolts, etc., which had hitherto been made by hand. It is said that it is capable of turning out fifty nuts per minute, thus effecting a considerable saving in time and expense. The Patent Nut and Bolt Company, limited, is at Birmingham. BROWN, *Engravings of Nuts, Bolts, and Washers*, etc., 4to., Sheffield, 1818.

NUTTI (Mco) of Siena, seems to have superseded A. di Ser Guido as maestro de' maestri between 1337 and 1350 to the duomo at Orvieto.

67.

NUTMEG ORNAMENT. This is a common feature in Early English work in the north of England, but not in the south. It resembles half a nutmeg; and is carved at certain distances apart, in the hollow of a hood mould or dripstone over the west door of S. Mary's church, Nun Monkton, Yorkshire; as shown in the *Journal of the Archaeological Institute*, iv, 134.

NUVOLO (FRA . . .) of the Dominicans, finished the campanile of Sta. Maria del Carmine from the third story, after G. G. Conforto; built *cir.* 1575 the church having five naves, of Sta. Maria della Sanità, which has a church under the altar; *cir.* 1575, the church of Sta. Maria di Constantinopoli; *cir.* 1620, the first cloister or monastery of S. Tommaso d' Aquino; *cir.* 1624, the round church of S. Carlo all' Arena; and rebuilt the church of SS. Pietro e Sebastiano in an elliptical or octagonal form; all at Naples.

95.

NYMES (RICHARD), "mason of Windsor", 1493-1500, was paid £40 on 19th January, 14th Henry VII, for works at S. George's chapel in the castle, executing under the supervision of sir John Shaa and master Seymour: 19th October, another £20; and October 26th, "to the master mason of Windsor, £40". Addit. MS. 7099 in the British Museum.

NYITRA, see NEITRA, in Hungary.

NYMPHÆACEÆ. A natural order of aquatic plants with floating leaves and solitary flowers. *Nymphæa alba*, the white, and *Nuphar luteum*, the yellow, water lily, are among the finest specimens of floral development in English latitudes. In Demerara grows the *Victoria regia*, having a flower of 15 in., and leaves as much as 6 ft. 6 in. across. The *Euryala ferox* emulates the latter in the size of its leaves, but the flowers are very small. *Nymphæa cærulea* is the citimbel; see LOTUS.

141.

NYMPHÆUM. This term denoted a grotto in a rocky or woody place, supposed to be frequented by nymphs. It is presumed by some to have had its name by corruption from *Lymphæum*, of *lympa*, water. In Attica, the remains of one

are still to be seen decorated with inscriptions and bassi relievi, from the rude workmanship of which it may be presumed that the grotto is of very ancient date. A well-constructed *adnicula* or nymphæum of four arcades, exists at Assos; *TEXIER, Asie Mineure*, ii. The nymphæum or reservoir, of the emperor Alexander Severus, the ruins of which are supposed to exist in the mass usually called *Trofei di Mario*, must have been, according to the medal (*DONALDSON, Arch. Numis.*, 8vo., Lond., 1859, No. lxxiii), one of the finest monuments in the city, adorned with precious marbles and numerous groups of sculpture and trophies; one of the latter is still preserved in the parapet of the steps leading to the Capitoline Hill; they are engraved in *PIRANESI, Antichità d'Albano*, fol. The nymphæum usually called the grotto of Egeria, is another instructive example of this species of structure, formerly abounding in ancient Rome; *BRAUN, Ruins*, 12mo., Lond., 1854, p. 46; 56. The building called a temple of Minerva Medica, was a hall or a nymphæum belonging to the great thermæ of the third century, of the time of Decius and of Tacitus, on the eastern side of Rome; *PARKER, Chron. Tables*, 8vo., 1876, i, 20. The small building near Castel Gandolfo, and also one on the lake of Albano, are generally supposed to have been nymphæa. The interior of the latter one has six niches on each side; *Handbook*, 1850, p. 568, this with that of Egeria, are given in *GAILHABAUD, Monumens*, 4to., Paris, 1842-52, i. Between the town of Pola and the amphitheatre, are the remains of a nymphæum now covered over and used as a public washing cistern; it contains an abundant source of water, and is surrounded by semicircular steps of Roman construction after the fashion of a bath. At Nismes is a fine example, formerly called a temple to Diana. One existing at Lyria, near Chelvest, is given in *LABORDE, Voyage Pitt.*, etc., en Portugal, fol., Paris, 1806, i, pt. 2, p. 92, pl. 118-9.

The recent excavations on the Palatine hill at Rome, have disclosed, in the palace of the Flavii, in a saloon on the north side of and adjacent to the triclinium or dining saloon, the remains of a nymphæum or fountain in an elliptical basin, with stages to receive flowers or plants: probably there was a similar nymphæum on the opposite side, and as the saloons opened into each other, the guests at the banquets enjoyed the freshness of the water and flowers.

Among the modern works passing under this designation, is one at the villa di Papa Giulio, consisting of a series of fountains called a nymphæum, *LETAROUILLY, Rome Moderne*, 4to., Paris, 1840-60, p. 468; pl. 220; and another at the collegio Nazareno, p. 700, pl. 341.

NYMPHÆUM. One of the many names for the fountain, tank, or basin, placed in the courtyard or atrium of a basilican church to serve as a laver or supply of water, not for ablution, but for lustration. *EUSEBIUS*, x, c. iv, says he placed, in the court over against the church, fountains of water as symbols of purification for such to wash as entered the church. *PAULINUS*, bishop of Nola, *Ep.* xii, ad Sever., calls it *cantharus*, which signifies any capacious "vessel that will hold water", and sometimes a "statue made to spout out water at its mouth". As *DU FRESNE* has observed, in some places the fountain was surrounded with lions spouting water, whence the name of *leontarium* in some modern Greek writers; and also called *ἐμβάτης* and *κολυμβητον*, all signifying a fountain. *PAULUS SILENTIARIUS*, in his description of Sta. Sophia, calls it *φιάλη*, phiala, which may be translated "basin". *SOCRATES* calls it

φρέαρ, the spring. *BINGHAM, Origines*, ii, 396, B. viii, c. 111. (*BASILICA*, 36.)

NYMPHENBURG, in Upper Bavaria; see *MUNICH*.

NYMPHI, NINFI, or NIMPHI (the *Nif* of the Turks, built on the site of the ancient *NYMPHÆUM*). It is situated about thirteen miles west of Smyrna, in Anatolia. The only remains are the Cyclopean acropolis; a Byzantine palace in ruins; and a sarcophagus with sculptured peacocks and griffins, of the same period, formed into a public fountain. The town was long the residence 1260 of the emperor Michael Paleologus. At some distance is the archaic monument called "Sesostris" (Rameses II, 1355-1289 B.C.), mentioned by Herodotus, B. 2, ch. 102-5. It consists of a human figure, 2 metres 30 cent. high, wearing the Egyptian *pschent*, sculptured in relief and sunk 42 cent. in a panel cut in the flat surface of the rock. It is considered a work of Lydo-Assyrian art, and about 3,000 years old. It was discovered 1817, by Rev. J. C. Renouard, chaplain at Smyrna. A lithograph is given in *CLASSICAL MUSEUM*, 8vo., 1844, i, 82; 231-7; and a cut from a photograph is given in *LANOYE, Ramsès le Grand*, 12mo., Paris, 1872, p. 128. Two other such memorials or pillars are mentioned; one on the road from Berytus to the mouth of the river Lycus; and on the road from Ephesus to Phocæa.

NYONS or NIONS (Lat. *NEOMAGUS*). A walled town, once one of the strongest places in Dauphiny, in the department of Drôme in France, situated on the river Eygues or Aigues, crossed by a Roman bridge, built of hewn stone, having one arch about 100 ft. span and 65 ft. in height.

NYSSA SYLVATICA or MULTIFLORA; black gum, yellow gum, and sour gum. A native of the southern states of North America. It is frequently 60 or 70 ft. high, with a diameter of 18 or 20 in. The bark is whitish; the wood fine-grained, but tender, the fibres interwoven and collected in bundles, and therefore difficult to split, on which account this wood is chosen by ship-builders for the cap or piece which receives the top mast. Also used for the naves of wheels; for hatters blocks; and for the cylinder which receives the cogs in rice mills. It weighs 40 lbs. 6 oz. per cubic foot. It is well subserved by the *Tupelo* or *NYSSA aquatica*, capitata, and grandidentata. *MICHAUX, N. Amer. Sylva*, 8vo., Phil., 1817, iii, 35.

NYSTRÖM (PER-AXEL), Hon. and Cor. member of the Royal Inst. of Brit. Archts.; and member of the Académie des Beaux Arts at Paris, etc., was born 1793 at Stockholm. His acquaintance with architecture soon attracted the attention of the court authorities, and being employed to direct the unpinning of one of the galleries of the palace, he acquitted himself with so much distinction that he was appointed court architect, and the academy granted him an annual allowance to enable him to prosecute his studies in France and Italy. In Paris he studied under Hipp. Lebas, 1819-21, and exhibited many interesting restorations. At Rome, under the direction of Fogelberg, he studied sculpture, chiefly decorative; and on his return to Stockholm in 1825, he was engaged on the design and decoration of the mansions and palaces in the aristocratic quarter of the city. He also designed the tomb of Gustavus II, at Upsala; the tomb of Ansgar at Björke, and the bishop's palace at Lund. In 1836 he was appointed professor of architecture at the academy of Fine Arts, and 1838 architect in chief of the city. He died at Stockholm, 3rd January 1869, aged 75 years.

A. C.

NORDEN.

THE SURVEYOR'S DIALOGUE.

JOHN NORDEN seems, according to WOOD (*Ath. Oxon.* i, 450), to have had birth in Wiltshire, about 1548. Admitted of Hart Hall in 1564, five years afterwards he became B.A., and proceeded A.M. in 1573. It was probably during his residence, that he drew with the pen, on sixteen sheets, that map of all the battles, fought in England, from the Conquest to the time of Queen Elizabeth, which is mentioned by HEARNE (*Letter on Antiq. etc.*, p. 34), as formerly existing in the picture-gallery at Oxford. WOOD ascribes to him fifteen devotional pieces, now very scarce, (among which, *The Labyrinth of Man's Life* has a true poetic style), though he doubts if any were really written by him; and GRANGER (*Biog. Hist.*), who describes a print of his portrait, attributes them to his father; but surely without sufficient grounds. He is the inventor of *An intended Guide for English Travellers*, 4to. Lond., 1625, the now common tabular form of calculation of distances, "showing how far one citie, and many shire towns in England are distant from each other". This was reprinted anonymously, 4to. Lond. 1643, and was the basis of many other publications, differing in little else but the title-page.

He was best known as a topographer, from the publication, 4to. Lond. 1728, of his *Survey and Map of Cornwall*; made probably in 1584, and perhaps printed from the Harleian MS. 6252, which contains coloured drawings of all the plates except the front of S. Germain's church. In the close of this document, which is addressed to King James I, the author observes: "Might it stand with your Majesty's good opinion and favour to enable me to proceed in the residue of your Majesty's kingdom (being by my former travailes, and by tedious attendance for my promised recompense, meerly undone), such shall be my loyal care and faithful diligence, as nothing shall be omitted worthy your Majesty's and his Highness' understanding, by Divine assistance, without which all endeavours are vain.—*Debentur pigro præmia nulla viro.*"

This work was part of a projected historical and chorographical description of England, under the title of *Speculum Britanniae*; but all that later appeared were the following divisions:—*Middlesex*, 4to. Lond., 1593, reprinted 1637, dedicated to Queen Elizabeth. In a prefatory letter to Burleigh, he speaks of long sickness and other impediments. It contains excellent plans of London and Westminster, engraved by Peter van den Keere. In 1596, he found it desirable to write a "preparation to this work, intended as a reconciliation of sundry propositions, by divers persons tendered, concerning the same." This is affixed to the second (third?) edition, 4to. Lond., 1723. The copy of his *Middlesex*, in the Harleian MS. 570, supposed to be in his own handwriting, differs from the printed copies, both in the arrangement and the additions made to it. *Hertfordshire*, also 4to. Lond. 1593, 1605, 1637, and 1723. In the prefatory letter to Burleigh the author says, "I have been forced to struggle with want, the unpleasant companion of illustrious desires, and have long sustained foils, enforced neglect of my purposed business and sorrow of my working business,—*Miseria mentem macerat.*" *Northamptonshire*, "done after this poor sort, being otherwise employed in surveys there," in 1610. This was reprinted in 4to. Lond. 1720.

In his maps, for the first time, are inserted the roads, the hundreds, and lines, apparently two miles apart, which divide the county, so as to save the trouble of mensuration, and to facilitate reference from the alphabetical index. His map of *Surrey* (1605) was much larger and more exact than any of the others; the survey was sold to a learned Hollander at the Restoration, according to AUBREY, who also mentions his *Kent*, which was in all likelihood undertaken with Kip. WEEVER, (p. 655), mentions the *Essex Survey* (1584), a thin folio MS. in Sir John Turner's library; and one of *Sussex* is also attributed to him.

There exist, a *Description of the honor of Windsor*, dated 1607, in the Harleian MS. 3749; and a *Survey of the manor of Blewberrie, county Berks, being parcel of the domains of the Prince of Wales*, dated 1617, taken by the subject of this notice and his son of the same name, deputed by Sir James Fullerton surveyor-general to the Prince; this belonged to Bishop More's library now at Cambridge. Bishop NICOLSON also mentions a *Survey of Skipton manor, county Berks*. He must have survived the year 1624, as he lived to finish, with his son, the *Survey of Sheriff Hutton manor, county York*, and he also wrote an *Account of the customs of the duchy of Cornwall*, formerly in the registers of the office. Another work was entitled, *A brief declaration of the titles, inhabitants, divisions, and situations of England or Britannia*, 4to. 1593.

He has also the credit of drawing, on eight sheets of paper, a *View of London*, with, at bottom, the Lord Mayor's show all on horseback, the aldermen in round caps. BAGFORD (p. 82) says, "This view is singular, and was

taken from the pitch of the hill toward Dulwich College, going from Camberwell to London, about 1604 or 1606," and that he had not met with any other of the kind. He adds, that "he saw it on the staircase at Dulwich College, and that Secretary Pepys went afterwards to see it and would have purchased it; but that since it is quite decayed and destroyed by the damp of the wall. It was given to the College with the library by Wil. Cartwright, an eminent comedian and bookseller."

GRANGER states, that "it does not appear that he received more reward than the employment in the survey of royal domains, for which he received a stipend of £50 per annum; that his topographical pamphlets, before they were reprinted, frequently sold for forty shillings each, and that his *Surveyor's Dialogue*, a work of merit, is very uncommon. This book has been through four editions in London, namely, 4to., 1607; 1610; 1618; and 8vo. 1738. The latter contained only the first three books, and has been used on the present occasion; the sixth is reprinted from the third edition, of which the title-page appears subjoined. With the omission of the fourth and fifth books, whose contents are stated in the index, it appears a work peculiarly fitted to the temper of the present times, when the Architect, far more frequently than any other professional authority, is called upon to give that advice, as to the best disposition of landed property, which he is as often entrusted to carry into effect. The work requires no other praise than a recommendation for perusal.

JOHN W. PAPWORTH.

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PROV. xvii, 2:

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divide the heritage among the brethren."
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A.D. 1618.

THE CONTENTS.

The First Book.—Containeth a communication between a Farmer and a Surveyor of Land; wherein is proved, that Surveyors of manors and lands are necessary both for the lord and tenant, and in what manner tenants ought to behave themselves towards their lords, in respect of their tenures.

The Second Book.—Is entreated between the Lord of a Manor and a Surveyor, concerning the estate of a manor, of the parts and profits thereunto belonging, and how the lord of a manor ought to deal with his tenants.

The Third Book.—Containeth the manner and method of keeping a court of survey, and the articles to be inquired of, and the charge; how to enter and enrol copies, leases, and deeds, and how to take the plot of a manor.

The Fourth Book.—Shewing the manner of casting up of the quantities of acres of all sorts of grounds by the scale and compasses, with tables of computation, for ease in accomplishing.

The Fifth Book.—Sheweth the different natures of grounds, and whereunto they may be best employed, how they may be bettered, reformed, and amended, fit for all farmers and husbandmen.

The Sixth Book.—Containeth a brief conference between a Purchaser of Land, and a Surveyor; wherein are some points necessary to be considered of such as are able and willing to purchase land in fee-simple, or by lease.

THE FIRST BOOK.

THE DIALOGUE BETWEEN A FARMER AND A SURVEYOR.

Farmer.

SIR, I am glad I have so happily met with you, for, if I be not mistaken, you are a Surveyor of land.

Surv. Admit it so, sir, what then?

Farm. I have heard much evil of the profession, and to tell you my conceit plainly, I think the same both evil and unprofitable.

Surv. You seem to be but a young man in years, and are you so deeply seen in the abuse of this faculty, that you can so peremptorily condemn it?

Farm. Call you it a faculty? What mean you by that word?

Surv. Ability to perform a thing undertaken.

Farm. Then this faculty of yours, I say, is a vain faculty, and a needless work undertaken.

Surv. Speak you this by conjecture, by report of others, or by due experience of your own?

Farm. I speak, indeed, as induced to the opinion I hold, by all the three reasons.

Surv. Then needs must you be either partial or malicious in the first two, and deceived in the third: for he that speaketh by conjecture hath not experience; and he that speaketh by report is as a trunk to convey an uncertain sound coming from one, to the ears of others; and if you speak by experience, then have you a pretence to have skill in the art; and by your own experience it seemeth, you condemn yourself to have abused the same, and so condemn a general necessary profession, in respect of your own particular error in the same.

Farm. No, sir, I am willingly unskilful in that contemptible vantage. But my experience groweth, by tasting of the evil that hath followed the execution of the thing, by some like unto yourself.

Surv. This is a general condemnation, rashly pronounced against all, for the abuse of some; and they only spew out greatest scandals, that are by examination in this business found most deceitful against their lords; and therefore no marvel, though the profession be contemned and condemned, of such as are to be condemned, for the offender cannot speak well of the apprehender, nor scarcely of the most just judge.

Farm. You speak as if you knew some abuse in me: I tell you, you do me wrong to attach me so.

Surv. Belike you think it free for you to censure other men at your pleasure, and to judge them after your own vain conceit, and yet no reply must take hold of your vain quarrel, that riseth of mere malice against the innocent.

Farm. Innocent? How can that be, when you pry into men's titles and estates, under the name (forsooth) of surveyors, whereby you bring men and matter in question oftentimes, that would (as long time they have) lie without any question. And oftentimes you are the cause that men lose their land; and sometimes they are abridged of such liberties as they have long used in manors; and customs are altered, broken, and sometimes perverted or taken away by your means; and, above all, you look into the values of men's lands, whereby the lords of manors do rack their tenants to a higher rent and rate than ever before; and therefore not only I, but many poor tenants else, have good cause to speak against the profession.

Surv. Be you not offended at the comparison which I will make to your allegations. Why should not such persons as are inhibited by the laws of the realm, to commit certain acts within the commonwealth, cry out against them, that by the same laws are appointed magistrates and officers to see these laws executed upon them, as rogues, beggars, and other like vagabonds? For if such officers and overseers were not, these offensive persons might have their wills: so should it follow, that men of peace, and good members of the commonwealth, should be endangered

to be sacked of that they have, by such lewd persons. Necessary therefore is it, that there should be such as should see unto, inform, punish, and reform these. And by your assertions you may as well intend, under like reason, against keeping of courts in a manor, wherein many abuses are found out, reformed, and punished, which without such courts, would lie smothered, festering so long, that there would be few sound members left within the same.

Farm. It seems, you compare tenants of manors that are (many of them) honest, civil, and substantial men, to rogues, and vagabonds. You forget yourself.

Surv. My plain words are, that as well these evil members of the commonwealth, may speak against the Surveyors of the commonwealth, which (to speak only of the under officers) are the justices of the peace, constables, and such like, as may tenants of a manor speak against the surveying of their lands within the same.

Farm. That were strange: for by the one, the whole state of the kingdom is kept in peace, and by the other, many millions disquieted, that might live quietly in their farms, tenements, houses and lands, that are now daily troubled with your so narrow looking thereinto, measuring the quantity, observing the quality, recounting the value, and acquainting the lords with the estates of all men's livings, whose ancestors did live better with little, than we can do now with much more, because by your means rents are raised, and lands known to the uttermost acre, fines enhanced far higher than ever before measuring of land and surveying came in, and therefore I think you cannot but confess, that other men, as well as I, have good cause to speak of you and your profession, as I do.

Surv. I perceive that the force of your strongest argument is, as before I said, your fear and unwillingness that the lord of the manor, under whom, and in whose land you dwell, should know his own: and that you think it better for you, that he should continue still ignorant of what he hath, and that your estates should be always hidden, and what injury you do should be concealed, than that he should be acquainted with what you hold, and your abuses, encroachments, usurpations, intentions, and wrongs discovered.

Farm. Sir, we acknowledge that the lord ought to have his rent, and that is all, and our services at his courts; but the land we have, is our own.

Surv. Howsoever you may account them yours, yet the lord hath such an interest and property in them, as he may also call them his; nay, I may say, you are not in such sort your own, but, next under the King, you may be said to be the lord's.

Farm. Fie upon you, will you bring us to be slaves: neither law, nor reason, least of all religion, can allow what you affirm, and therefore, as I before conceived, so I may now protest, that you, and such as you are, are even the cords whereby poor men are drawn into a servitude and slavery, and therefore I say again, it is pity any of you have any employment in the commonwealth.

Surv. What, sir, because I say you are in some sort the lord's? I tell you, that I mistake it nothing at all; for as the King is supreme head and prince, and defender of all his subjects, so under the King is every lord of a manor chief and head over his tenants, namely, over such as hold of him: and he hath a kind of command and superior power over them, as they are his tenants, and for that cause he is called, and they do acknowledge him to be their lord. And what doth the word lord import, but a ruler or governor? If he be your lord, then are you his, to be governed in causes determinable within the manor, and if they refuse the service due to the lord, the lord may distrain for it, or may enter upon their lands, and resume it as his own in some case; so that I may well say, that in a sort, even your lands and

yourselves are the lord's. The use and occupation is yours, but if the land were so yours as were none above you, you might then call it yours; but so is none but the kingdom, which the King holdeth of none but God. And no man is so absolute within the kingdom, but he holdeth his land of some manor, or person, or of the King. And of whom such land is holden, the same is called the lord of that land after a sort, because it is held of him by some kind of rent or service, and by possibility this land may come unto, and by law be cast upon the lord of whom it is holden, as, if you be so willing as you seem, to talk of these mysteries, you shall anon perceive. And therefore you cannot but say, that the land and yourselves are in some sort the lord's. And therefore is it lawful for the lord of the manor, to inquire and examine of the things in those kinds belonging unto him? And if there be clean and plain dealing among tenants, they need not fear who look into their lands and estates. But if there be deceits and wrongs against the lord, policy willeth you to banish any man, and to bar all the means that may discover them, though equity and honesty be contented to discover all things, to the manifestation of truth. Are not these the matters of chief importance that disquiet you? The measuring of your lands, the observation of the quality, and estimating the value of your lands.

Farm. It is true: for these are the causes our rents are increased, and our fines raised, and this would the lord never do, if such as you did not enkindle the lord's desire, by your too severe scrutations, examinations, impositions, and imputations: for were the lords of manors ignorant of these things, as in former times, poor tenants might have things at the rate they had in former times.

Surv. My friend, if I compare you to a dead image, be not offended, for I perceive you have eyes to see, and yet you see not, you have a heart to understand, and yet your understanding is amiss.

Farm. I am beholden to you, sir, to make me worse than a beast, for a beast hath the things you say I want: how prove you what you have said?

Surv. Because you impute your great impositions unto the act of an honest Surveyor, when I will assure you, and prove, that the cause is in and of yourselves.

Farm. Then indeed you might account us brutish, if we would work our own woe.

Surv. I perceive, though you may be a good worldly farmer, you are but a mean observer of the course and carriage of things passing daily under your nose. He that hath seeing eyes, and an understanding mind, may easily see and perceive, that there is no manor, nay, no farm, be it great, or little, far off, or near hand, but hath been and daily is discovered, by private intelligencers, lurking in or near the same, prying into estates, aiming at the quantity, wide, short, or over, seldom hitting right, observing also the quality, and glancing at the value of every man's land, and thereof secretly and underhand do inform the lords of the farm, and they being credulous overmuch, and not a little covetous, build their demands both of rents and fines, upon these most deceivable informations, whereby the lord is abused, and the tenant wronged: whereas, were the things seen, viewed, and surveyed by a judicious and faithful Surveyor, who upon due consideration, and discreet observation of all particulars, gives in a true and indifferent certificate unto the lord, using rather his uttermost endeavour to moderate and mitigate the lord's excessive demands than aggravating the validity beyond reason or a good conscience, you would be of another mind; and I protest, I hold that Surveyor a very bad man, that will, either for affection or bribe, carry a partial hand between the lord and his tenants; yet sith he holdeth as it were the beam of the balance, he should rather give the better weight to the weakest, respecting nothing but a charitable course to be held by the lord, for whom he travaileth with the tenant, against whom if he speak not, he shall be often suspected of the lord to be partial. But if there be equal consideration on all sides, the

lord will believe the Surveyor deals justly, and the tenant rest satisfied, willing to leave, or readily to accept, as his own judgment agreeth or disagree with the things propounded. For this have I observed, that oftentimes tenants consider not when they are kindly used, neither see they at all times when they are abused.

Farm. Truly, I believe you in part: for, indeed, there are, even amongst us, in the manor wherein I dwell, officious fellows, that, to procure the lord's good opinion, will pry into men's estates, and, indeed, as you say, into the quantity, quality, and value of men's lands, and give false information oftentimes; and I know it is a foul abuse, and, of the two, I rather allow a true survey than a false report: for such fond fellows as are thus busy in other men's causes, are of all men least to be believed; for they speak always for affection or gain; for they will extenuate the value of them they love or have gain by, and aggravate the same, as their hope is of the lord's reward:—all this I know without your report. But what is that to the thing you charge poor tenants withal, that they are the cause of their own hard measure? Clear yourself of this slander.

Surv. That can I easily do by experience, and I think I shall have the whole world to witness it for your further satisfaction, who cannot yourself be ignorant of the same thing; for you have in part confessed it: for the former informers, of whom you last spake, are even tenants themselves; yet I accuse them not all, nay, I excuse none in particular: for I have seen and observed among them a kind of madness, as I may call it, but in the best sense it is a kind of ambitious, or rather avaricious emulation, wherein they strive one to outstrip another in giving most: as where myself have had business of this nature: namely, of letting, setting, or selling of land for years or lives, being, or near being determined, in farms or other like, whereby the lord hath been at liberty to dispose thereof at his will, for best advantage, by choice of a new tenant, proclamation to that effect hath been made in open court, where I have seen, and it is daily in use, that one will outbid another, insomuch as I have wondered at their emulation, and could not have asked what they have raised it unto themselves. And should any that is in authority in this case (who in duty is not to hinder the lord) or the lord himself, inhibit such hot spirits to climb as high for the lord's advantage, as the ladder of their own will, and supposed ability will willingly carry them? This is not as oneswallow in a summer, but they are many, and everywhere winter and summer, and yet are other men accused and condemned for them and their faults, if their will (though wilful) be a fault: but I should think it greater madness for a lord, wilfully to refuse what is so voluntarily offered, and so willingly given. Now, who is the cause of raising rents and fines?

Farm. I know, such rash and over-forward men there are in the world not a few, almost in every manor, who are especially pricked forward to this emulation through envy and avarice, having means to achieve their desires. But this bidding and outbidding is in things, wherein the lord is at his liberty to take as tenant whom he list. But in customary tenements of inheritance the case is otherwise, where the rent is and the fine (for the most part) certain, what needs the lord have this surveyed, or any freehold lands?

Surv. It is fit the lord should know what his tenant holdeth, be it free or customary, though at this day there be a needless niceness in some freeholders of manors, who seem to conceal their estates, and to kick against the view of their lands: but if they knew what they did, they would reform that error.

Farm. Call it you an error, for a freeholder to refuse to shew his estate to the lord, or not to suffer his land to be surveyed?

Surv. I may well so call it; nay, I may call it a great fault, or an injury done against the lord, and hurtful to himself. There is none (it may be you know it) that holdeth land of a lord, but he holdeth the same by some kind of rent or service, and when he comes to take up his land after the death of his ancestor, or upon purchase, but he doth or ought to do fealty,

unto the lord of whom he holds it: the doing whereof, how ceremonious it is, if you be a tenant to any such land, you know, and wherein he maketh a solemn vow and oath, to be true tenant unto the lord for the land he holdeth. And sometimes the tenant of such a tenure, is forced to be aided by his lord for the same land, if he be impleaded for it: now, if such a tenant refuse to shew his estate, or to permit his land to be seen, how performeth he his oath, to be true tenant, and to do such services as are due unto the lord? Among which, this, of permitting the lord to know his own, is not the least, nay, he ought by his oath of fidelity, to further it by all means, both by his proper knowledge and evidence, not only his own, but other men's lands, and thereby he shall not only not prejudice himself, but he shall fortify his title so much the more, by having his evidence enrolled, and his land recorded in the lord's book of survey, that when his heirs shall take up the land, or he alien the same, it appeareth that he is true tenant unto such lands, for such rent, and for such services: but there be so many scruples thrust into men's heads by such as have a pretended skill in matters of policy in this kind, and lords of manors have been so remiss in taking knowledge of the things in this manner appertaining unto them, that questions of titles and tenures are daily had and moved, to the great trouble oftentimes both of lord and tenant, as is seen by experience daily, as well of land holden of the King, as of inferior lords, which may be reconciled, if tenants were not too curious, and lords too negligent. Besides this, there are other reasons to move the lord to know what land is holden of him, and by what title, rent, and service: for freeholders may forfeit their land, and their land may escheat unto the lord: if then he should be ignorant what land it is, where it lies, and how much it is, he may be easily abused for want of records: and so are many lords of manors, who for want of due knowledge of their tenants, and of their land and tenures, other men are intitled to their right.

Farm. You have said more than I heard or dreamed of, and it holdeth in some sort by reason; how it is by law I cannot dispute; but in all that you have said, you have not satisfied me in the thing before I spake, touching the fines of customary tenants of inheritance, which (as I said before) have been of late raised far higher than in former times, by your Surveyors.

Surv. You strike always one string, and I find the sound of your meaning: you would always be as easily charged in your fines as might be; and in that I blame you not, it is every man's case to bear as light a burden as he can. But if you remember what I spake before, touching the cause of this raising of fines, where I proved it came most by your own means, you may be the sooner satisfied in this, for it is in nature like the former. Although this kind of tenant hath seldom any competitor, to emulate his offer, because the tenant leaveth commonly one either in right of inheritance, or by surrender to succeed him, and he by custom of the manor is to be accepted tenant, always provided, he must agree with the lord, if the custom of the manor hold not the fine certain, as in few it doth: now this composition is commonly made by demand of the lord, and offer of the tenant. The lord asketh according to his conceit of the value of the thing, and either his knowledge must arise by his own experience, or by information: the information is either by secret intelligence of some officious neighbour, or by due judgment of an indifferent Surveyor, namely, such a one as carrieth equal respect to lord and tenant. And although, as you allege, former times did afford tenants more favour in rating and arbitrating fines, as you suppose, if you consider it well it is now as then it was.

Farm. You much mistake it: for I will shew by ancient court rolls, that the fine of that which is now twenty pound, was then but thirteen shillings and fourpence, and yet will you say they are now as they were then?

Surv. Yea, and I think I err little in it. For if you consider the state of things then and now, you shall find the proportion little differing: for so much are the prices of things vendable by

farmers now increased, as may well be said to exceed the prices then, as much as twenty pound exceedeth thirteen shillings and fourpence.

Farm. You speak far from truth, and I marvel you will err so much, pretending to be a man of that reach, that men employ you to overreach others.

Surv. To shew you then an instance, look into the chronicle in the time of Henry the Sixth, and you shall find, that a quarter of wheat was sold at Royston in Hertfordshire for twelve pence: and I trust, if you be a farmer, you are a corn-seller, and I think, if a man offer you thirty times as much for a quarter, you will say it is better worth.

Farm. Was it possible that corn was then and there so cheap, and to rise since to this rate? It is very strange.

Surv. Not at all: for since there grew such an emulation among farmers, that one would outbid another, (which in the beginning was little seen) it grew at length that he that bought dear, must sell dear, and so grew the prices of things by degrees to this rate as now they be; and a farmer gets as much by his farm now, as then he did.

Farm. You err therein, I assure you: for else could farmers keep as good houses and hospitality now, as they did then, and alas, you see how unable they be.

Surv. It is true, and the reason is manifest; for where in those days farmers and their wives were content with mean diet and base attire, and held their children to some austere government, without pride, haunting alehouses, taverns, dice, cards, and vain delights of charge, the case is altered; the husbandman will be equal to the yeoman, the yeoman to the gentleman, the gentleman to the squire, the squire to his superior, and so the rest, every one so far exceeding the course held in former times, that I will speak without reprehension, there is at this day thirty times as much vainly spent in a family of like multitude and quality, as was in former ages; whereof I speak. And therefore impute not the rate of grounds to a wrong cause, for to tell you truly, both lord and tenant are guilty in it; and yet they may be both content, for they are as the sea and the brooks; for as the rivers come from the sea, so they run into the sea again.

Farm. To tell you truly, you have said more than I have heard, and indeed it stands with some reason; and you have in part satisfied me, that the cause of our complaint is not so grievous as I and infinite others have supposed it. Yet to tell you, as I and others have found, there be some of your profession have either none at all, or little, or very hard consciences, and, for the most part, such as have least skill, and such, indeed, I think unnecessary for lord or tenant; for they cannot but abuse the one or other by their reports; and the records which they make may breed quarrels many years after. And, therefore, as the Surveyor is a member (as you hold) not only tolerable, but necessary, I wish there were fewer, and they honest, just, and skilful; for, to tell you truly, we have thought among us countrymen, that there are more than can be employed, as it seemeth by their public declarations of their want of work; for as I have passed through London, I have seen many of their bills fixed upon posts in the streets, to solicit men to afford them some service; which argueth, that either the trade decayeth, or they are not skilful, that beg employment so publicly; for a good workman needs not stand in the streets or market-place.

Surv. I confess, in this you have said truly: for none that is indeed fit for employment, will, or needs to crave it, in such manner, for they will be sought unto and solicited. But every one that hath but a part of the art, nay, if he can perform some one, two or three parts, is not thereby to be accounted a Surveyor, as some mechanical men and country fellows, that can measure a piece of land, and though illiterate, can account the quantity by the parts of money, as a penny to a perch, a groat to a day's work, ten groats to a rood, and consequently, a mark to an acre, which manner of casting sufficeth, and satisfieth them in their small accounts, but the manner of their measuring is

often erroneous, as I will shew you hereafter, if leisure serve. Some have the skill of plotting out of ground, and can neatly delineate the same, and by arithmetic can cast up the contents, which is a necessary point of a Surveyor's office, but not all.

Farm. Saving your tale, sir, we poor countrymen do not think it good to have our lands plotted out, and methinks indeed it is to very small purpose: for is not the field itself a goodly map for the lord to look upon, better than a painted paper? And what is he the better to see it laid out in colours? He can add nothing to his land, nor diminish ours; and therefore that labour above all may be saved, in mine opinion.

Surv. They that speak at any time against anything done, or propounded to be done, do either shew their reasons against it, or else they conceal their conceits, and without any good argument, inveigh only against the thing; and I know your meaning in misliking plotting of your land, and yet you utter not what you think; for a plot rightly drawn by true information, describeth so the lively image of a manor, and every branch and member of the same, as the lord sitting in his chair, may see what he hath, where, and how it lieth, and in whose use and occupation every particular is, upon the sudden view; which tenants mislike, not that the thing itself offendeth them, but that by it they are often prevented or discovered of deceitful purposes: for a tenant that is both a freeholder and a copyholder for life, or by indenture for life or years, holding these lands intermixed, may easily (unless the land for life or years, be very especially butted and bounded in their copies or leases, as seldom they are, through the sloth of some stewards, or for default of a true survey to guide them) appropriate unto himself copy or leased land for free, and especially having time enough to alter names and properties, to remove meers, and to cast down ditches, to stock up hedges, and to smother up truth and falsehood under such a cloak of conveniency, as before it be suspected or found out by view, it will be clean forgotten, and none shall be able to say, this is the land; whereas if it be plotted out, and every parcel of free copy leased, and the rest be truly distinguished, no such treachery can be done against the lord, but it shall be most readily reconciled. And I dare presume to say, that the want of due plots and descriptions of land in this form, hath been the occasion of infinite concealments, and losses of many men's land, and many intrusions and encroachments have been made, and so long continued, that now neither memory nor record can reform them; besides infinite other abuses, which are daily done, to the prejudice of lords, for want of such a monument to be always at hand for their instruction.

Farm. You aim, unhappily, I think, to some men's purposes; but for my part, I promise you I had no such thought in me, and yet what you say, may indeed be easily wrought in most manors, if they be as the manor is wherein I am a tenant: for I am persuaded, there hath not been any view taken of it, or perambulation made, or survey had, within the memory of any man alive. And to tell you truly, I think the lord hath much wrong both by his own tenants, and by confining lords; for so the lord have his rent, and his other duties of us, he is contented; but I may tell you, if he did better look into it, it would be better for himself and his hereafter, yet we wish he would let it rest as it doth, for we may do in manner what we list, and if a Surveyor come, we shall not do as we have done, nor hold that that some have held long without any trouble; but that I leave. Then you say, that plotting is the chief part of a Surveyor's skill.

Surv. I say not so, but I say it is necessary for him that is a Surveyor, to be able to do it, and that he be painful and industrious, and having this quality with the rest more necessary, he may be then called a Surveyor.

Farm. What are they, I pray you?

Surv. To little purpose I think I shall tell you; yet because you may know that every one that hath the name, is not indeed a Surveyor; for besides the former faculty of measuring and plotting, he must have the understanding of the Latin tongue, and have some sight in common laws, especially of tenures and

customs, and must be able to read and understand any ancient deeds or records, French and Latin, and to judge of the values of land, and many other things, which if time will permit, I will hereafter declare more at large unto you.

Farm. Why is there such a precise knowledge required in a Surveyor?

Surv. Because they are employed in such businesses as concern greatest persons in their estates; for although men be endowed by the providence of God, and of his bounty, with honours, manors, castles, houses, lands, tenements, woods, and other like revenues, which indeed are the sinews and ligaments which conjoin and tie honour and ability together, yet if these be not managed, guided, and carefully continued and increased by a discreet and honest Surveyor, for, and in the name and behalf of his lord, and the lord again proportion his expense and charge according unto or within the compass of his known incomes, the lord may be disabled to maintain that which he hath gotten, the title of honour; and where honour is without means, it wanteth the substance, and hath only the shadow of itself to delight in.

Farm. It behoves not only men of nobility, but inferior men also, to look unto themselves, for the preservation of their estates, but they indeed that have but little may quickly view it: *sufficit exiguo strigilatio curta caballo.* But he that hath many honours, manors, lordships, tenements and farms, cannot himself take view of them all with ease; for indeed they lie for the most part dispersed in many parts, and they must be aided by the skilful and industrious travail of some judicious Surveyor, who finding by his view and examination, the true values and yearly possibilities of his lord's lands, may be a good mean to retain his lord within compass of his revenues, and to work him to be good to his tenants, and by that means the Surveyor shall deserve praise, and his lord win more honour. But I marvel how such great persons did before surveying came up, for this is an upstart art, found out of late, both measuring and plotting.

Surv. You speak, I think, according to your conceit, but I will prove it far otherwise, that measuring, plotting, and surveying, hath been used in all ages of old. As for description, it was used in Egypt by Ptolemy the King, who described the whole world. And where the river Nilus in Egypt overflowed the banks (as at this day it doth about harvest) the violence of the inundations was such, as they confounded the marks and bounds of all the grounds that were surrounded, in such sort as none knew his own land; whereupon they devised to measure every man's land, and to plot it; so that afterward always at the water's recess, every man could find out his own land by the plot.

Farm. Truly that was a most excellent invention, and I think it indeed a most necessary course to be held in some grounds that I know in England, which are subject to like confusion: many marsh lands near the sea coast in Kent, Sussex, Essex, Suffolk, Lincolnshire, Cambridgeshire, and other shires confining the sea, are subject to great waters, and if they were thus plotted out as you say, I must needs confess it were a good work, howsoever these kinds of grounds should be hereafter surrounded, increased, or diminished, by the force of the sea's continual rage, whereunto they are daily subject, for by that means, if the ditches, which are the ordinary meers, metes, and bounds, between several men's lands, be confounded, this device might, after the winning of these surrounded grounds again, truly reconcile them, and allot every man his own, which otherwise will be impossible to bring to true appropriations. And this, in my conceit, is not the least part of your profession, to lay out grounds in their true forms, that every several parcel may be distinguished from other; for I know where great strife hath risen by confounding one manor with another, where the sea hath won and lost ground, and devoured the true bounds, of which I am not alone witness; and it is daily seen, that questions do arise by like casualties, where towns, houses, fields, woods, and much land, hath been and are daily devoured, and in some places augmented; rivers by force turned out of their

right courses upon other confining lands; whereof time hath taken such hold, as the truth is now brought in question, to the stirring up of quarrels between parties, which, if these places had been formerly laid out in plot, the doubt would be easily answered. In these things I cannot but agree with you, that your profession may stead men that have use of your travail in this kind, although no such art hath been used, nor is it reported to have had any use in the Word of God.

Surv. Is there a necessity to produce the use of this, from examples out of the Word of God, when these indifferent things are left to the discretion of man, for matters of politic and civil society? If every profession should be driven to fetch authority from the use in sacred things, many things plentiful amongst us that live in a commonwealth would be found profane; but because you seem to urge it, I will not stick to let you know, that it is not without example in the Old Testament. If, first, you will have the proof of measuring, look into the second Chapter of Zacharias, and there shall you find, that the prophet reporteth, that "he saw a man with a measuring line in his hand, and he asked him whither he went? and he said unto him, To measure Jerusalem, that I may see what is the breadth thereof, and what is the length thereof."

Farm. I do remember now that I have read such a thing indeed, but, as I take it, this measurer was an angel of God.

Surv. Then is the warrant of measuring so much the more strongly confirmed unto men. But you may perceive, that measuring was then in use in other things; for had not there been the use of the measuring-line before, how could the prophet have known it to be for that purpose?

Farm. Yes, being a prophet.

Surv. He could not have called a thing by its proper phrase (to the understanding of other) that had not been in use before, neither could his relation thereof have been understood of them to whom he declared it, unless they also had before known the like.

Farm. Can you prove the like of surveying?

Surv. Joshua commanded the children of Israel, that every tribe should choose out three men, that he might send them through the land of Canaan, to view, survey, and to describe it; for so is the word, "Ye shall describe the land into seven parts, and bring them hither to me." And what description could they make, without viewing and surveying the places?

Farm. It is true that you say, such a view was taken at that time, that every tribe might have his portion of inheritance. And surely in these Surveyors was much trust reposed by Joshua, the chief head of the children of Israel; for, according to their report, did Joshua divide to every tribe his portion. This, surely, was a work of great discretion and judgment in the Surveyors, and great providence in Joshua; for, indeed, he could not travail in all those parts himself, and, therefore, he did wisely to appoint such as were fit to perform the service; and it makes me remember your former defence of the profession, in travelling for great persons, who cannot afford time nor pains to view their own lands themselves. And it is not every man's gift to be able to divide lands into equal, or certain unequal parts, that men that are parties therein, may hold them equally dealt withal, unless it be such an one as hath skill in dividing and apportioning, which thing comes often in use among men in this commonwealth. And further authorities, or better warrant than these you have produced, for my part I will require none, unless you can and will voluntarily shew some later examples within our own kingdom, done in our forefathers' times, for I like not novations and new devices that our forefathers have not seen or done.

Surv. If you had time and experience to look into, and to understand what hath been done concerning this matter long ago, you should find in the records of the Tower, even before the Conquest, matter to satisfy you that this profession was then in use, and there shall you find the fruits. And since the Conquest, the book called *Domesday*, lying in the Exchequer, will

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confirm you, I think, sufficiently, that it is not, as you say, a new invention. Besides, the same art hath been, in sum and substance, established by Act of Parliament (3 *Edward* 1), and called *Extenda Manerii*; upon which statute, that learned judge, master Fitzherbert, hath written a little commodious and compendious treatise; so that if you stand upon any further authorities, I will leave you to the present general use thereof, which men of best discretion and greatest revenues do hold and continue, and none spurn against it but the malicious or ignorant.

Farm. I confess, I was lately ignorant of the things which now in part I know, but I was never malicious: as for the records and statute whereunto you refer me, I believe you without further search, and for my own part, I am sorry that ever I have so, with others, backbitten the profession, and slandered the honest professors thereof; for I now do well see, and plainly understand, that the same is lawful and expedient, and not any way hurtful unto the tenants, if the Surveyor be skilful and honest, and his information (given by skilful and willing assistants, which are the tenants themselves) be true, and his help of the lord's records ready; for these are the two pillars, upon which a Surveyor must of force build his work, information and record, as I take it, although record be always preferred before verbal intelligence; yet if records be never so authentic and true, of things unknown to him that hath the examination of them, what can be effected or done, but as by a blind man that knoweth his face is to his way, but how and where to step he is uncertain? and although he desire none to bear him, because his legs are sound, yet he will not refuse to be led by the hand the way he would go. So a Surveyor, in my poor opinion, that hath a bundle, nay, a whole trunk full, of records of several tenements and parcels of land, whose names he can read, whose buts and bounds he can relate, but yet he sees not the way of himself to go to them, or can say, without direction, "This is this or that piece of land," and therefore I know that tenants must give aid to a Surveyor, or else he will fail, though not in his art, yet in truth of his work.

Surv. You have said well, and it appeareth your apprehension is good in this business, and, indeed, the aid of the tenants is a good help in this case, especially when records are also present; for if record and their information concur, then is the Surveyor in the right way. But many times, if the Surveyor cannot help the tenants by his records when they are at fault, he shall hardly find which way his game goes; for a skilful Surveyor, carrying his record in his hand, in his perambulation of a manor, shall, after the first entry, be able to guide himself, and go from place to place, from field to field, even by his own evidence, if they be truly made, and the buts and bounds right, especially if the names continue unaltered, and that the tenants can avow it as he citeth it, and nothing then is to be altered, but the names of owners, who change often. And for this business, the fittest men to accompany the Surveyor abroad, are the most ancient, and longest inhabitants within the manor, for the Surveyor's instruction; and the youngest, to the end they may also learn to know the like, to give like aid by their experience to posterities.

Farm. Methinks it were a good course (if I be not too saucy), that a Surveyor should, after his perambulations made, and the particulars entered, publicly read the same before the tenants in open court, to the end that they may approve or reprove what is true or mistaken, for the best may err in setting down many things.

Surv. I like your advice well, and surely he that doth not so, and compare it also with former records, doth not as becometh. But I know, and have found by trial, that tenants think it a hard imposition, once in their life-time, to attend such a business,—they had rather do any work than to do their lord service, and themselves this good; for many of them are so wise in their own conceits, as they think them fools that give any assistance unto this work; and some so wilful, that if they knew that they and theirs should be for ever benefited by it, they will stand

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aloof, and any small occasion of their own will easily withdraw them from it; and some, again, are so worldly, that they think no day well spent, but that is spent upon their present profit; and, lastly, some are so given to their vain delights, as neither love of their lord, or fear of forfeiture of their tenements, or doing good to their neighbours, or securing their posterity, can get any duty in this behalf to be done by them.

Farm. As far as I conceive, the lord of a manor may force his tenants at such a time to give their attendance; else, you may well think, not a few would find excuses enough to absent themselves.

Surv. You say well, and therefore hath the law provided a punishment for those that will not do their duties in this, or in anything that the lord hath to do within his manor, for ordering of his tenants. And because tenants should not be forgetful of their duties, they were in former times, and may be still, summoned to the lord's court every three weeks at this day. And the lord's remissness in calling them, hath bred in many places a kind of contempt, whereby groweth their slackness in times of their lord's service. But the lord of a manor hath power to punish them, and they are remediless without submission, if the pain be within the compass that the court will bear, which is large enough to weary him that is most arrogant.

Farm. You have satisfied me in many things whereof I doubted, you have cleared the profession itself of many slanders, and for my part I will henceforth speak more sparingly, and advise such as I hear too forward to be better advised.

Surv. Every manor is a little commonwealth, whereof the tenants are the members, the land the body, and the lord the head; and doth it not follow that this head should have an overseer or Surveyor of the state and government of the whole body? And follows it of necessity, that the office is unlawful? An unjust officer maketh not the office unjust, no more than a crabbed face impairerth the fair glass wherein it looketh, or a dusky cloud corrupts fair water whereon it lowereth. In case of survey of land, against which you have so much inveighed, if you consider it in reason, and make it your own case, you will say, perchance, the case is altered. You have now peradventure a small farm, will you be careless and dissolute of the state thereof? Will you not weigh and consider with yourself what land is fit for pasture, what for arable, what for meadow, and the like? And will you not command your servant to view it daily, that no trespasses be done therein, and to see unto the hedges, ditches, fences, water-courses, gates, and such like? Will you not regard the estate of your cattle, their number, health, and safety? And have you not a continual watch over all your servants and children; and to the preservation of things within and without? If you do thus in one small farm, what would you do in many?—could you see unto them all yourself? If you had as many manors, would you lie at home and receive the rents and fines that your tenants would bring you, without consideration of the estates or values, quantities or qualities of the things for which you receive money? And why have you this care, or would you look into these things? Is it not, because it is your living and livelihood, by which you and yours are maintained? And how much the more it is neglected, so much the more it decayeth; and if it decay in quantity, you cannot continue equal in quality. And can you, therefore, think it a hard course in that lord (that having his lands, which are his livelihood, dispersed in divers parts of the realm, to which, through greater employments of importance, he cannot personally resort; if he could, it is neither for his experience, nor fit for his calling, to travail therein), to authorize and send such as may take view of his revenues, and of the estates of his tenants, who are, by custom and law, in many things bound unto him; and that by such, his substitute, he may be truly advertised of what he hath, and how his means do arise, that he may proportion his charge and expenses accordingly? and whether he be abused by his tenants, or his tenants by his officers, or one tenant by another, or the lord wronged by confining lords, by intruding

too far into his lands, how rents be answered, and customs continued, how freeholders do perform their suits unto his courts, how his tenements are maintained and repaired, how his woods are preserved, his fishings, fowling, and prerogatives, maintained?—all which, by how much the more they are neglected and let run without view or survey, so much the more doth the lord weaken his estate, and prejudice his heir; wherein, it cannot be denied, he offendeth God, deceiveth the King, and defraudeth the commonwealth. God, in that he is careless of his blessings bestowed upon him; the King, in that he wilfully disableth himself to do him the service he oweth him in body and goods; and the commonwealth, in that he disableth himself to give it that assistance that his quality and place ought to afford; and, consequently, sheweth himself unworthy to oversee matters of state and commonwealth, that is careless to see unto his own. Furthermore, where a due and true survey is made and continued, there is peace maintained between the lord and his tenants; where, if all things rest between them confused, questions and quarrels arise, to the disturbance of both. In private families, if there be none to oversee and to manage things domestically, what disorders, what outrage, what uncivil and ungodly courses, and what spoil and ruin of all things do follow? The like, of necessity, where tenants are left unto their own wills; and yet, as the unruly company in a family could be contented to be masters of themselves, and to have no controulment; so tenants can well brook their lord's absence, and that they might be their own carvers, and that the lord should have what they would yield of their own accord. I speak not of the honestly minded; but where a multitude is without a guide or governor, there is disorder; and disorder breedeth complaints; and complaints are unsavory to a kind landlord, who must be forced for redress to punish the offenders; and the most offensive will speak most of their wrong, and will soonest exclaim against any course that may keep order. So that, to conclude, I affirm, that it is most requisite and expedient, for due order's sake, that every lord of a manor should cause his lands to be duly seen, and truly surveyed and certified, and once in seven or ten years to have it reviewed; for the inconveniences that grow by the neglect thereof, are of so many kinds, and they so dangerous (like the most perilous disease long concealed), that they work contempt in the tenants, and loss to the lord. Now, to keep this upright between the lord and his tenants, I think you cannot deny, but a true and honest survey is necessary and lawful, and may be performed with a good and safe conscience, and in the fear of God, if (as I have said) the conscience be not before stained with the corrupt desire of unlawful gain; and (as I said before) I think few or none will mislike the course, but such as are far gone in some disease of deceiving their lord, which cannot endure to have this kind of salve to come near their sore.

Farm. Truly, sir, I know not how to answer you, but do consent to that you affirm; for, for mine own part, I cannot but confess, I can find nothing in mine experience to contradict your speech. But pity it is that Surveyors should be ignorant or dishonest; for the one especially abuseth the lord, and the other wrongeth both lord and tenants.

Surv. But whether is there cause in your conceit, to approve or reprove the profession, as it is simple in itself? Deliver your mind plainly, leave not a scruple in the minds of your neighbours, that have exclaimed with you against them that never offended them, reproving, as much as they durst, lords, for looking into their own lands; and, unless lords were dead images or pictures of men, having only the name of lords, and could not at all command their tenants, that could neither hear, see, nor consider, what were fit to be done with their own proper revenues, I cannot but wonder that any should spurn against them herein.

Farm. I think you speak something too forcibly against tenants in general; for, surely, all are not opposite to this course, though some be.

Surv. I condemn none; but I reprove some, that of mine own knowledge have given testimony of their inward dislike, by their outward murmurs; for, what is done with an evil will, cannot be said to be done at all. Such as come cheerfully to the service are dutiful, and I hold it impiety to abuse them; but the unwilling deserve little favour.

Farm. What should tenants principally do in such a business?

Surv. Nothing, but that law, custom, and duty requireth at their hands: to give their best aid to the Surveyor, to travel with him about the circuit, buts, bounds, and limits of the manor, to inform him of the same, and of every particular man's land and rent, to shew him their copies, leases, and deeds, to the end he may enter and enrol them all together in a fair book, for the lord's use, and for a perpetual record for themselves.

Farm. For information, and shewing the particular grounds and bounds of the manor, indeed is fit; but for their evidences, as their copies and leases, the lord hath the Court rolls of the one, and counterpaines [counterparts?] of the other; and for freeholders' deeds, their land is their own, and whether they may be compelled to shew them or not, I cannot tell.

Surv. These are frivolous doubts that some have formerly made, but they have been answered to their cost, for the law hath compelled them to shew their evidence. For, admit the lord of the manor have the rolls wherein the copies are recorded, may not copies be abused after their entries, or counterfeited in some things prejudicial to the lord, as may also the lease, as hath been found oftentimes,—names and lives of men, parcels of lands, dates of years, and such like, rased, inserted, or altered? And is it not fit, therefore, that they be seen and entered together, that without search of so many Court rolls the lord may be satisfied, and the tenants justified? And what prejudiceth it the tenant to have his evidences truly recorded, if he mean plainly,—be it copy, lease, or free deed? he may think it a confirmation of his estate, what casualty soever come to the same, he may be the better assured that such a record will witness with him; whereas, if none such appear, his interest will be the more suspicious; and, therefore, such as are wise and discreet, will not only consent to this good course, but be thankful unto the Surveyor as behoveth. If it be just and right that the lord should know his own, and who should manifest it but the tenant himself? and how should he do it but by his evidence? And most unjust it is, in that tenant, that, by any wilful or sinister means or covert practice, doth either detract his fellow-tenants from the service, or concealeth anything that may further the same.

Farm. This I cannot deny, although, indeed, some busy fellows will dissuade and breed a doubt herein; but I see it is to good purpose, and for our better security, to do all things requisite in this business, and that all the tenants within the manor should conjoin in one, and every one for himself, and all for one, and one for all, should seek, examine, and declare the uttermost truth of every thing towards the exact performance of his service, and that the Surveyor should know the quantities, qualities, and indifferent values of every man's tenements and lands, their rents, services, custom, works, and whatsoever the tenant is in law or conscience bound to yield or perform to his lord: and, indeed, thus much have I heard given in charge at a court of survey, with many other articles which are now out of my mind—all which may be done by tenants with a good conscience, both by relation in courts, and in the perambulation; but the concealing of these cannot stand with a honest mind in mine opinion; for these things, of themselves, cannot prejudice the tenants, but the misconceiving, misentering by the Surveyor may be erroneous, and the over-racking, urging, and over-burdening the tenants by the lord may be extortions. These things may fall out by means of an unjust and unskilful Surveyor, and a covetous landlord. And the fear of this maketh the tenants to extenuate the values, and to smother the truth of things, to their soul's danger; therefore, happy are those tenants that have a gracious lord and an honest Surveyor; for then there cannot be

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but an equal and upright course held between them; then cannot the tenants but be faithful and loving to their lords, and their lords favourable to them; so should the tenants be defended by their lords, and the lords fortified by their tenants, which were the two principal causes of the original foundation of manors, as I have heard.

Surv. You say rightly, and I am glad to hear you conceive so well of this apparent necessity; for, so may I say, that it is of necessity that the lord should know the full and absolute estate of his manor, and of every particular thereof: for, howsoever of late days tenants stand in higher conceits of their freedom than in former times, if they look a little back into antiquity they shall see that tenants (for the most part) of every manor in England, have been more servile unto their lords, and in greater bondage than now they are, whom the favourable hand of time hath much enfranchised, and it cannot be altogether everywhere forgotten, because they may see as in a glass, the picture of their servitude in many ancient custom rolls, and in the copies of their own ancestors, and many servile works have been due and done by them, and in many places yet are, though the most are now turned into money; but neither their enfranchisements, nor the conversion of works into rents, do so far free them, but that they still owe services unto their lords, in respect of their tenures, as well freeholders as customary tenants, as both in most of their copies and deeds is expressed in these words, *pro redditu et servitiis inde prius debiti, et de jure consuet.* Which proveth their tenures in a sort to be conditional; which condition, if it be wilfully broken by the obstinate carriage of any such tenant, he endangereth his estate.

Farm. It were hard, if for not doing some small service unto his lord, a man should forfeit his living.

Surv. And it were very foolishness in a tenant, for wilful refusal thereof, to endanger the same; for if the lord be in law tied to maintain the right of his tenant, and to defend him against any other that shall pretend a false title unto his land, the tenant is again bound to perform all such services, and to pay all such duties as of right he ought unto his lord. And it is expedient that the lord should see these duties continued, and it hath been and is daily observed, that the neglect thereof extinguisheth the remembrance of them, and so the lord loseth his inheritance; for every service of the tenant is parcel of the same, and the remissness of looking into these tenures, hath brought it to pass, that infinite within this kingdom, that hold in fee, quilllets of land, and some manors, know not how or of whom they hold; so that hereby lords of manors, of whom these quilllets were heretofore known to hold, have lost their tenures and services, and such as hold the land by unknown tenures, are cast into the danger, to hold to them and their posterities further hurt.

Farm. If tenants will be wilfully obstinate, and refuse to do and continue their uttermost services unto their lords, as bound by their tenures, being (as you say) parcel of the lord's inheritance, they are worthy to be attached of disobedience, and to pay for their contempts; and if lords will be so negligent, as they will not look unto their own, they are worthy to lose their right; and therefore I hold it discretion in the one to do his duty, and providence in the other to continue what is due; and if by age or impotency the tenant be disabled in person to perform his service, to crave dispensation, or to do it by another; and if the lord be far off and cannot be present, to substitute one to receive it for him. But, sir, in all your discourse, I have observed, you have pleaded (as it were) for their lord, against the tenants, exacting sundry duties from them to their lords, but I have not heard you speak much against the lords, in favour of the tenants, and yet I know there is a kind of reciprocal bond of duty each to the other, and may be broken of either side.

Surv. It is very true; for as children are bound to their parents by the bond of obedience, so are the parents bound to their children by the bond of education; and as servants are

bound to their masters in the bond of true service, so are the masters bound to their servants in the bond of reward. In like manner, tenants being bound unto their lords in the bond of duty, so are the lords bound unto their tenants in the bond of love; and though I have said little at this time of the duty of lords to their tenants, the occasion hath not been offered at this time.

Farm. I trust you have said enough concerning the duty of tenants, for they can but pay rent, and do service, more cannot be exacted.

Surv. Yet rent and services are divers and diversely answered and done, which I could be content to shew you more at large,

but that yonder comes a gentleman that will interrupt us; know you what he is?

Farm. I will tell you by and by as he comes near. Oh, sir, it is my landlord, a man of great possessions, lord of many manors, and owner of divers farms, who hath been inquisitive for a man of your profession, but to tell you truly, I altogether dissuaded him before this time; but now having heard your reasons, I will solicit him for your employment, and I would wish you might undertake first the manor wherein I dwell.

Surv. At his disposition and pleasure be it; and so for this time I leave you.

THE END OF THE FIRST BOOK.

THE SECOND BOOK.

THE DIALOGUE BETWEEN A LORD OF A MANOR AND A SURVEYOR.

Lord.

FRRIEND, of late I met with a tenant of mine, who told me you are a Surveyor of land.

Surv. I have been, and am sometimes employed in that kind of service.

Lord. I have at this time some occasion to use the aid of one of your faculty; and I have heard by my tenant, that your skill and diligence may satisfy my desire therein.

Surv. I shall do mine endeavour wherein you please to command me.

Lord. There be many, I know, that bear the name of Surveyors, but when they are put to it, they come far short of some principal points required in the absolute performance of the work, and either leave it half done, or so shuffle it up, as the lord is abused, and the tenants wronged, by the blind and uncertain returns of the Surveyor's travails; for a lord of a manor knoweth not, but by such as he useth therein, the estate of things, and how the particulars stand between the lord and his tenants. If the lord of the manor have never so good a mind to deal well with his tenants, and the tenants be never so inclinable to do true duty to their lord, they may be both misled by an unskilful Surveyor, to the unjust condemnation or suspicion of both. And, therefore, I think it behoveth men of worth, that have use of such as you are, to be well assured of the skill and ability which you pretend to have in your profession; and, because I have no further experience of you than the bare report of my tenant, I must entreat you to discourse unto me a little of your knowledge, of such particulars as are to be considered in the absolute survey of a manor.

Surv. Sir, you seem to oppose me far, and the thing you demand will require a longer time and a larger discourse than either my leisure, or peradventure my present memory of every particular, will readily permit. And it may be, that you that pretend little knowledge in the art, may apprehend both the truth of the thing, and an error committed in the performance, as well as he that assumeth the title of a Surveyor, although neither your leisure nor your quality may in reason permit you the travail in it; for I know many gentlemen of good worth, that have the speculative parts of the whole, and the practice of the deepest, and yet they will not be seen to tread that path that a Surveyor is forced to do, in the whole business. You have the matter and subject whereon a Surveyor worketh, and without which a Surveyor loseth both art and name; and, therefore, you cannot be altogether ignorant of the things required in the business: as the master of a feast cannot dress the dainties, but the cook; yet can the master reprove the cook if he do not his duty therein.

Lord. Thou sayest true in thy comparison; but for my part, although indeed I have land, and I know how many manors I have, their names, and where they lie, and the most of my tenants, and their rents, (and if you should err in these, it may be I might be able to reprove you), yet for matters of further search, I assume not to be skilful, for then I needed not your service, as of quantities, qualities, values, validities of estates, tenures, customs, and other things incident to a manor, which are not in all manors alike, the true discovery whereof belongeth to the Surveyor's office, yet none but such as are truly skilful can sufficiently discharge the duty herein required; and therefore by your leave, you shall briefly (I will not be tedious) relate unto me what you can say of the definition of a manor, whereof it consisteth, how, when, and by whom it was erected, with other such things as shall be expedient for the lord of a manor to know, the particulars whereof I will leave to your relation, and first tell me what a manor is.

Surv. Sith you will needs dive into my poor skill, by your opposal, and sith indeed I do in some measure profess the art, wherein I think no man is or hath been so exquisite, but he might err in some point or part, much or little, as in other arts, yet to answer your demands, I will as briefly as I can satisfy your desire. And first, where you demand what a manor is: *a manor in substance is of lands, wood, meadows, pasture, and arable; it is compounded of demesnes and services of long continuance* (*Perk. fo. 127*). As touching the beginning of a manor, and the institution thereof, the beginning of manors was, when the King gave lands unto his followers, in such quantity, as did exceed the proportion of a man's manurance and occupation, as a thousand, two thousand acres, more or less; which quantity of land being at that time as it were in a lump or chaos, without any distinction of parts, or qualities of land, he to whom such land was given, to hold to him and his heirs for ever, enfeofed some others in parts thereof, as one in ten, another in twenty, and some in more, some in less acres, and in consideration of such feoffments, every of these were to do the feoffee some kind of service, as he and they agreed upon, reserving such a part unto himself, as he might conveniently occupy in his own hands, and by this means the land thus given by the King, and thus proportioned out to others by the donee, became to be called a manor. And he that was thus invested in this land by the king, was in respect of such as he infeoffed, called the lord, and such as were infeoffed, were called tenants; lord, in respect of government and command; and tenants, in respect of their tenures, and manner of holding under the lord, whom they were to obey.

Lord. But when, or about what time, was this erection of manors?

Surv. As I take it, and as it seemeth, in the time of the Normans; for among the Saxons was no such name as the name manor, yet the thing even in substance was then, for they had demesnes, and services in substance, but the demesnes they called *inlandt*, and the services *utlandt*, so that it differeth only in name, but in jurisdiction little or nothing at all.

Lord. Whereof is it called a manor?

Surv. There is some difference of opinions whence the word manor should be derived; it is in latin called *manerium*, yet a word not used among the Romans or ancient Latins, and therefore to find the *etymon* by it, cannot be; for the word is used among our lawyers, as many other made words are, which have been terms raised by our laws, and are not elsewhere in use; and therefore the nearest way to find the signification of the word, is by the quality of the thing; so that some hold it should proceed of the latin verb *manere*, which signifieth to abide, or remain in a place, as the lord and his tenants did in this, whereof the head house, or the lord's seat was called *berrye*, which signifieth in the saxon tongue a dwelling place; which continueth yet still in Hertfordshire, and in divers other places, and is also taken sometimes *pro castro*, which was also the seat of the lord of some manors. Manor houses were also, and yet are called in some places, halls, as in Essex, and northward; courts and court-houses westward, as in Somerset, Devon, etc., as also manor places; all which are places of the lord's own abode, and therefore it may not unfitly be said, to take name of abiding or dwelling. Some think, and not improperly, that it taketh name of the french word *manemir*, which signifieth to till and manure the ground; and of the two, I take this latter to be the most proper derivation of the word manor; for thereof are many chief houses of tillage called *predia*, graunges or *fermes*, which word farm is taken of the saxon word *feormion*, which signifieth to feed or yield victual; for in ancient time their reservations were as well in victual as in money, until at length they were turned into money; and some farm rents do yet continue in victual. Furthermore a manor may take name of *mainer*, to govern and guide, because the lord of the manor had the managing and direction of all his tenants within the limits of his jurisdiction. Of these derivations *qualem navis accipit*: necessity ties to neither.

Lord. These significations of the word may stand all with sense, and much material it is not whence the word ariseth, but the likeliest is indeed that which most agreeth with the property of the thing. But I have within my manors sundry messuages: whence is the name derived?

Surv. Of *meisus*, or *mesuager*, which is as much to say, as *familiam administrare*, to govern a household; for every of the tenants had his family, and of divers of them and of the lord's family did a manor consist.

Lord. Then no doubt, if a man have a thousand acres of land more or less, to him and his heirs, which lieth in one entire piece, not yet divided, it may be divided into parts, as a portion for the lord himself, and some parcels to erect such messuages for tenants to do him service, as he may make a manor where none was before.

Surv. No, sir, for although a man have a competent quantity of land in his manurance, and would convert it to the end you speak of, were it never so great, and could establish many messuages, and could erect whatsoever services, this would not become a manor, because all these must have long continuance, which cannot at this day be confirmed by any private man, but by the King only; but he may have thereby a kind of seignory, a lordship or government in gross over his tenants by contract or covenant, but no manor. No man at this day can create a service or a tenure, or by any means raise or erect a manor: for there must be very lord and very tenant in fee simple, and that of ancient commencement and continuance, or else it can insure no manor. For a man may have demesnes to occupy, and tenants to do him services, and that of continuance, and yet no manor. As if a man that had land, did give part of this land in

former time to some others in tail to do him services, here are demesnes in the donor, and services in the donees, and a tenure; yet because there be not very tenants in fee simple, it maketh no manor.

Lord. Whether are all lands holden of a manor, parcel of the same manor?

Surv. No, lands may be holden of a manor by certain services, the service may be parcel of the manor, and yet the lands not.

Lord. But may not this land be made parcel of the manor at this day?

Surv. By no other means but by escheat, for if the land fall unto the lord by escheat, then it comes parcel of the manor; for then is the service extinguished, and the lord cometh in place of it.

Lord. May not a man purchase land that lieth near his manor, and annex the same, and make it parcel of the manor, though it held not of the manor before?

Surv. Foreign land, newly purchased, though it lie within the precincts and bounds of the manor, cannot be annexed, though the tenant thereof be willing to do his services there; for this is in nature of a new creation of a tenure, which at this day the law will not admit, only the King by his prerogative may.

Lord. What, if it were tied unto the lord of a manor for the payment of an annuity, is not the annuity then parcel of the manor? And if that land be purchased by the lord, and thereby extinguish the annuity, doth not that land come in place of the annuity, and so become parcel of the manor, as the land you spoke of before, which, by the escheat, ran in place of the service?

Surv. The case is not alike; for the annuity was not parcel of the manor, neither can it be by such means as you propound by the way of mortgage (22 Edward 4, c. 44.) But in another sort it may; as if a manor be to be divided into sundry parts, and because the parts fall out unequal in value, there must a rent or annuity be apportioned to make up the value, which rent becomes parcel of the manor (22 Li. Ass. 53).

Lord. If the manor be divided as you say, and a rent allotted to one part, how can the rent be parcel of the manor? for as much as in my understanding, the manor becometh by this partition, to be no manor; for if there can be no addition to a manor, there can be no division of a manor, and yet the manor to continue still a manor.

Surv. Yes, sir, of one manor may be made divers at this day.

Lord. How, I pray you?

Surv. If a manor descend to divers partners, and they make partition, and every one hath demesnes and services, every one hath a manor, and every one may keep a court baron (26 Henry 8, c. 4).

Lord. What if a man make a feoffment upon condition of parcel of his manor, or do grant a lease to another for life of part, or do entail part, are not these parts still parcels of the manor?

Surv. If parcels of a manor be once thus severed, they immediately become no parcels thereof; yet may they all revert and become parcels of the manor again, as if the condition of the feoffment be broken, if the tenant for life die, or the limitation of the entail discontinue for want of heirs.

Lord. Then a man may say, that though such land be not, yet the reversions are parcels of the manors.

Surv. So it is intended.

Lord. Well, you have reasonably well satisfied me in these points, yet would I gladly have some further satisfaction of some other matters, touching the state and profits of a manor.

Surv. I would be willing to do my best to content you, but you partly hinder me of other business. What else would you know? I wish brevity.

Lord. It shall be so, neither shall you lose your labour; for I mean to use you, if my future satisfaction be answerable to this former,—may every manor keep a court baron?

Surv. Every manor in the beginning, no doubt, might keep a court baron, and so it may at this day, unless the manor be so dismembered, as it wanteth that which may warrant the keeping thereof; for if all the freeholders of a manor do escheat, or all but one, the manor is then disabled to keep a court baron, for the court cannot be kept without suitors, which are the freeholders (35 *Henry* 1).

Lord. Then, methinks, the manor loseth the name of a manor; for if it lose the quality, it is not the thing; no more than a log that had fire can be said a fire-log, when the fire is extinct (*Fitzh. c. 3*).

Surv. It is true, it becomes no manor, but a seigniori, having no power to keep a court baron.

Lord. An ignorant Surveyor, I see, may be easily deceived, in terming that which is no manor, a manor; and that no manor, which, indeed, is a manor. But satisfy me in this one thing:—A man having two manors lying together, and the one of them is decayed, and hath lost its power to keep a court baron, and the lord is willing to have the tenants of both these manors to do their suits and services to one court, namely, to that which standeth yet in force, and that methinks were good for the tenants to ease them, and it would preserve the lord's right without prejudice to any, for then one homage would serve both, and both serve as one, one bailiff, and other officers, as if it were an entire manor.

Surv. Yet this cannot be, for this union of the manors cannot extinguish their several distinctions, for they will be still two in nature, howsoever the lord covet to make them one in name; and the more powerful manor hath no warrant to call the tenants of the decayed seigniori; but every act done in one to punish an offender, in the other is traversable; and, therefore, it is but lost labour to practise any such union. If it be considered by such as are forced to service in this kind, they may refuse it; yet if they will voluntarily submit themselves to such a novation, and the same be continued without contraction, time may make this union perfect; and of two distinct manors in nature, make one in name and use,—and I do not think but such there are.

Lord. Then is there, as it seemeth, no means to annex two manors in one, howsoever necessary it were both for the lord and tenants.

Surv. Yes, sir, two manors may become as one, if one manor do hold of another, and it escheats to the lord; the escheated manor may be annexed, and united, and of two distinct manors become one, if the lord will, in use.

Lord. I am answered in this point, and it standeth with more reason, indeed, than the former; now, I pray you, tell me what things do properly belong to a manor?

Surv. There do belong to a manor, lands, tenements, rents, and services, as I shewed you before in part, which are a parcel in demesnes, and parcel in service.

Lord. But speak, I pray you, something more at large of every of these; and, first, tell me what demesnes are?

Surv. Demesnes are all such lands, as have been time out of the memory of man, used and occupied in the lord's own hands, and manurance, as the site of the manor-house, meadows, pastures, woods, and arable land, that were reserved for the maintenance of the lord's house from the beginning.

Lord. This, then, is that you call parcel in demesne; what is that you call parcel in service?

Surv. All those lands, tenements, and hereditaments, which yield rents of assizes, as rents of freehold, copyhold, or customary land; all which are parcel of the manor, yet no demesnes.

Lord. But is not all customary land, copyhold land? Why then make you a distinction between copy and customary?

Surv. All copyhold land is commonly customary, but all customary is not copyhold; for in some places of this realm, tenants have no copies at all of their lands or tenements, or anything to shew for that they hold; but there is an entry made in the

court-book, and that is their evidence, and this especially of the ancient duchy land of Cornwall, and other places.

Lord. These tenants then may be called tenants by court-roll, according to the custom of the manor, but not tenants by copy of court-roll.

Surv. It is true, but they are held only a kind of conventional tenants, whom the custom of the manor doth only call to do their services at the court, as other customary tenants do.

Lord. The word *convenire*, whereof they be called conventional, doth, as I conceive, import as much as to call together, or convent, although some would have the word conventional to come of *conventum*, of covenant,—namely, to be tenants by covenant,—but the former is more probable. But what say you to the rents of assize? What mean you by assize?

Surv. Truly, for my part I take it to signify set in certainty; for these kind of rents are as in the beginning, neither risen nor fallen, but do continue always one and the same; and only they, and none else, can be properly called rents of assize.

Lord. I think you take it rightly; and are all rents of one kind?

Surv. No; there are properly three kinds,—as rent-service, rent-seck, and rent-charge.

Lord. These terms are strange to me, though I be lord of many manors; and, no doubt, I receive rents of every of these kinds; but how to distinguish them, I cannot tell. And whether I have been abused by mine officers or no, I know not; for they never told me of these many kinds of rents; and, therefore, let me intreat you, for my satisfaction, a little to explain their several natures?

Surv. These several rents are paid upon several considerations, and have several grounds and commencements, and are diversely to be levied and recovered if they be denied. That which is called rent-service, is so called because it is knit to the tenure, and is as it were a service, whereby a man holdeth his lands or tenements: as, where the tenant holdeth his lands, by fealty and certain rent, or by any other service and certain rent, the rent is called rent-service; for, as the service followeth a tenure, so the rent followeth the service. And if this rent be behind, the lord of common right may enter and distrain for it. And if the lord cannot find a distress in two years upon the land of rent-service, he may have a writ, called *Cessavit per biennium* (*Sta. de West. 2. Ca. 21*), and recover the land. The rent-charge is so called, because when a man granteth any land, whether it be in fee-simple, fee-tail, for life, for years, or at will, and in his deed reserveth a rent, with clause of distress for non-payment, by virtue of this clause, the land is charged with payment of the rent, by express words, and by force of it the lord may distrain for his rent behind. And it is to be noted, that if a man grant land under a rent-charge, and after taketh to himself some of the land, he extinguisheth the rent. Otherwise it is in a rent-service, for there the rent shall be apportioned.

Lord. This kind of rent is at this day, I think, most common; for few will grant land, but they will make such provision, that the land shall stand charged with the rent.

Surv. It is true, for at this day there can be no rent-service raised, because it cannot be without a tenure, which cannot be at this day created.

Lord. What is that you call rent-seck?

Surv. It is a bare rent, reserved upon a grant, wherein there is no mention made of charging the land by distress, and it signifieth *redditum siccum*, a dry rent, for the recovery whereof the land is not charged, and so no distress lieth against it; but being once seized of the rent, and being after detained, he may have an assize, otherwise he hath no remedy.

Lord. Few such rents are now a-days, for a man had need to make all the provision he can to secure his rent, and yet he may be driven to try his uttermost means to recover it. But you have satisfied me, also, touching these rents; now let me intreat you to shew somewhat of other things incident unto a manor, by which the lord receiveth profit or prerogative.

Surv. Profits may arise by infinite means and ways out of a manor to the lord, but all manors yield not profits or commodities alike, neither in nature or value.

Lord. I think, indeed, all manors are not alike profitable to the lord, neither hath every manor like means; yet I desire to know, for my experience sake, what may grow out of a manor, that I may the better look into the natures and qualities of such as are under my power and command.

Surv. If you have a manor, or manors, there is (as I said before) a court baron at the least incident thereunto, and to some a leet, or law-day, which is called the view of frank pledge, by which courts do grow many and divers perquisites and casualties,—as fines of land, amercements, heriots, reliefs, waifs, estrays, forfeitures, escheats, profits growing by pleas in court, and such like.

Lord. You may do well to show me, though briefly, what every of these former things do properly import; for to tell me the names, and not the natures of the things, is, as if I should know there is a sun, but whether he give light and heat, to be ignorant. Therefore, before you pass further in any discourse, shew me how fines of land do arise unto the lord, and what amercements are, and the rest.

Surv. Fines of land are of sundry kinds, and yet properly and most especially they arise of copyhold or customary lands and tenements, which are in divers manors of divers kinds: for there are customary lands, which are called copyhold of inheritance, and they are such as a man holdeth to him and his heirs, according to the custom of the manor, at the will of the lord. When such a tenant dieth, and the heir cometh to be admitted (if the custom of the manor bear a fine certain), he giveth but the accustomed fine; if it be uncertain and arbitrable, he agreeth and compoundeth with the lord, or Surveyor, or steward, for the fine. Some hold customary land for lives,—as for one, two, or three lives,—whereof the fine is always at the lord's will, as is also the fine for years. There are also fines for licenses of surrenders of customary land, and for alienation also of freehold land, and these are called fines, which signifyeth as much as a final composition; and when the fine, which is the end of the contract, is answered, all but the yearly rent during the term agreed upon is paid. These and such like sums of money raised at a court baron, are parcel of the perquisites of the court, as are all amercements, which are sums of money imposed upon the tenants by the steward, Surveyor by oath, and presentment of the homage, for default of doing suit, or for other misdemeanors, punishable by the same court, infinite in number and quality.

Lord. Whence taketh the word amercement name?

Surv. Of being in the lord's mercy, to be punished more or less criminally, at the lord's pleasure and will. It is, no doubt, a borrowed word, as many other words used in our common laws are: for he that is amerced, is said to be in *miseriordia*, that is, in the mercy of some body.

Lord. These words may be understood by use, and by the manner of the use of things; but he that should seek the *etymon* among the latins, of the substantive *amerciammentum*, and the adjective *amerciatius*, might seek long, and be never the nearer. But, I perceive, we must take it as our fathers first framed it and left it; I understand what it meaneth in our common sense, and that sufficeth.

Surv. Other words, not a few, in like sort to be understood, we find in use amongst us, which, doubtless, the Romans never knew: and yet they that have to do with the things wherein they are used, understand the meaning, although their derivations be strange, as amongst others, it is questionable whence the name of a heriot may be derived.

Lord. That would I be glad to learn, for I have to do sometimes with heriots; but because I know not why they are so called, what they be, how, where, when, by whom, and for what they should be answered, I do fear I am sometimes abused.

Surv. I may tell you as I have heard, and of myself conjectured, whence the word cometh; but I have no certain authority for it. It may be said, and most likely it is, that it should come of the word *herus*, a lord and master, and *heriotus*, belonging to the lord. And it was in the beginning a thing for the wars, as the best horse a man that died, had at the time of his death. And the saxon word *nevges* had the same signification that the word *heriotus* hath, and importeth a thing pertaining to the wars; which was, a horse trapped, or a spear, or armour, or a sword, or some such military weapon, which was parcel of the tenant's service due to his lord; and if such a tenant had been slain in the wars in the company of the lord, he had paid no heriot. *Si quis in exercitu, sive in regno, sive extra, pugnans coram domino, mortem oppeterit, ei condonatur et remittitur heriotus* (19 Henry 7, c. 15). Whereby it seemeth, that his service in the wars belonged unto the lord, and death being the uttermost end of his service, he had done as much as his service bound him to perform; and after his death, his horse and furniture came in place of the service due unto the lord, and thereof called a heriot, being due unto the lord, *de jure*, after his death, and the remission was of any further heriot of his goods than that which he left behind him at his death in the field, which of right the lord might seize, as it seemeth by these words, *Si quis in curia, sive morte repentina fuerit intestatus mortuus, dominus tamen nullam rerum suarum partem, propter eam quam jure debetur, herioti nomine, sibi assumitur*. So that it appeareth, that at the death of every tenant, there was due unto the lord of the manor of right this *heriotus*,—a thing appertaining to the lord.

Lord. A heriot is never paid, but after the death of a tenant.

Surv. Yes, in some places, if the tenant surrender, forfeit, or will voluntarily depart from his customary tenement or lands, he shall pay to the lord his best quick good, in the name of a heriot, and in some places a piece of money, in the name of a farewell, or farelife.

Lord. It falleth out in a manor of mine, that divers customary tenements heriotable, are dismembered, and such tenements as in former times could yield unto the lord a good horse, ox, or cow, cannot now yield any quick good at all, because the lands are sold from the tenement, and I lose my right: what remedy have I?

Surv. You must take such a heriot as the tenant deceased hath at his death.

Lord. But the land which belongeth sometimes unto the tenement whereof he died seized, is severed so, as there is no entire parcel in any other man's tenure, above one or two acres; is there nothing due for that at the death of the chief tenant?

Surv. No, surely; for, the lands being lawfully surrendered, whereof the lord cannot but always take knowledge (for it cannot be done without his consent), he cannot pretend to have wrong therein; yet this benefit remaineth to you that are the present lord. You may take the advantage of any quick, or dead goods, which any of the tenants have at their deaths, that hold any of the parcels of the land lately belonging to this heriotable *meese place*. And if a tenant have but half an acre thereof, and have elsewhere more land, within or without the manor whereupon he keepeth any kind of cattle, of whatsoever value, though holden of another manor, the best is yours, wheresoever you can lawfully seize it after his death; yea, although it be upon his freehold, as some say (27 Li. Ass. 24).

Lord. I like that well; yet, I promise you, it is more than I thought I might have done, and I have lost much by mine ignorance. But may I not compound with all such tenants as have these parcels, to give for every acre so much money, *nomine herioti*? and may not that agreement bind them and their heirs for ever, being recorded in the court-roll?

Surv. No, sir; you cannot make any new custom, although all the tenants consent willingly thereunto: yet, if such a composition were made and continued, without any contradiction of posterities, time might create a new custom, by prescription, and be good.

Lord. What if a tenant have several heriotable tenements, and die? whether shall he pay one or more heriots?

Sure. He shall pay as many as he hath tenants heriotable.

Lord. But there comes a thing into my mind; I pray thee, if thou canst, resolve me. Whether is the heriot paid, in respect of him that is dead, or in respect of him that is to possess the land after him?

Sure. In respect of him that is dead, plainly; for it is not said, it shall be the best good of him that shall inherit, but of him that died; and whatsoever legacies he gave by his testament, the lord will have his due, howsoever they be answered, and may seize it though it be sold.

Lord. It stands, indeed, by reason. But is there but one sort of heriots?

Sure. There are two sorts; the one called heriot custom, the other heriot service. It is held of some, that tenants in fee-simple only pay heriot service, and not a tenant for life; and this kind of heriot is commonly expressed in the grant, or deed, and the land is charged with the payment, and therefore the lord may distrain, or may seize it; and if the tenant bring his action for the taking, the lord may avow, as for other services. Heriot custom is of another nature, for it is held to be *de gratia*, a mere benevolence, given to the lord by his tenant at the time of his death; and now hath custom confirmed it as a debt due, recoverable by force of justice. Some say, it was first given by villeins and bondmen.

Lord. That needeth not; for if the villein and all that he had were the lord's, of common right, as I have heard it was, what needed the lord to take a benevolence, when he might have taken all at his pleasure?

Sure. You say truly, yet it might be given as a continual future gratification upon their infranchisements and manumission, to be yielded at the death of every such tenant. Divers customs of divers places make divers kind of yielding heriots.

Lord. I know that well; for custom, as is said, is above the law. Now, I pray you, say something touching reliefs; for I take it, that was the next branch of your division of the profits rising of a manor; but, first, whence comes the word?

Sure. Reliefs, in french, is as much as *relevatio* in latin, which is derived of *relevo*, the verb, which is, to raise and set up again; and, therefore, M. Bracton saith, "*Relevatur hereditas, quæ fuit jacens per mortem antecessoris.*" Whereby it appeareth, that the heir payeth this relief as a consideration and recompense unto the lord, to be raised unto the possessions of his deceased ancestors; for this is all the benefit that the lord hath after the death of his former tenant, having neither the custody of the land, or body of the heir, as in some cases the lord hath of both.

Lord. The difference, then, as I gather, between an heriot and relief is, that the heriot is paid in the name of the tenant deceased, and the relief, in respect of the heir that is to become tenant, after the death of his ancestor, to his possessions; but whether of these is the most ancient?

Sure. Surely, the heriot; for that was given in the Saxon's time, as is proved before, and that especially of things pertaining to war; but the relief came since, by the Normans. And where these matters of war are continued and paid in kind, it is under the name of heriot; but where the Normans made composition, and took money for all, it is called relief; so that it seemeth that both these in the beginning were one, but now become two distinct things, both in name and nature.

Lord. You have before told me how the heriot is; now tell me how the relief is paid.

Sure. The relief is paid after the death, change, or alienation of every freeholder, or of a tenant in ancient demesne. And the relief in some places is the whole year's rent, in some manors two years, and in some places half a year's rent, as the custom of the place permitteth (19 Henry 7, c. 15); in Cornwall, in many manors, they pay for relief for every penny, five-pence; and if the relief be not paid, the lord may distrain of common right.

Lord. You have said enough of reliefs, now speak of the rest; and, as I remember, the next after reliefs was waifs—what are they?

Sure. Waifs, or waived goods, are goods or chattels of what nature soever, stolen, and, in the fugacy of the thief, he leaves them behind him for want of convenient carriage or conveyance, being pursued; and wheresoever such goods are, they are the lord's of that manor or liberty wherein they are found, if the prerogative of the manor will bear it; for every manor will not carry them, but such as have it by grant from the King.

Lord. Whence cometh the word waif?

Sure. The goods thus stolen and left behind the thief, are called in Latin, *bona*, or *catalla vaciata*—a word which our common lawyers only use, and the signification is gathered by the use; for, I think, none that is a stranger to the terms of our common laws, be he never so well seen in tongues, can say this word signifies the thing for which it is now taken.

Lord. Well, then, as long as we understand the meaning by the use, it sufficeth, without further examination or disputation about the word itself. But how is it to be proved stolen goods? for it may be as well casually lost as feloniously stolen.

Sure. Therefore, when any such thing is found within a manor, the bailiff or other the lord's officer, seizeth it to the lord's use, as a thing wherein at the instant no man claimeth property. And if it be not evident by the pursuit of the thief that it was stolen, it is proclaimed and presented the next court, and found by the jury of what nature it is, and that the property is in the lord; and because these and estrays are spoken of at large at every court baron by the steward, no man can pretend ignorance of them; therefore I will omit to speak any more of them. But a little of forfeitures; though, no doubt, you being lord of many manors, know right well what they are, and how they grow; and the tenants, no doubt, could wish you and other lords knew less than generally you do, how and when they happen.

Lord. Tush; if there were no penalties, men would commit offences without fear, and if there were no forfeitures for abuses done against lords of manors, tenants would too boldly make wastes and spoils of the lord's inheritance, without regard of law, love, or humanity; and, therefore, let me hear your opinion what forfeitures are, and for what causes lords of careless tenants may take advantage of forfeitures, who may omit and forgive as they see cause.

Sure. I know many lords too forward in taking advantage of forfeitures upon small occasions, and if manifest cause be given them, they show little compassion. And if I knew you were a man desirous to take advantage in this kind, I would be sparing to discover anything tending to that liberty; for, I well conceive, that the law did not so much provide to enrich the lords of manors by their tenants' forfeitures, as to keep tenants in good order, and to restrain them (with fear of losing their tenements) from rash and wilful abuses; as the statutes of the realm, we see, have heavy penalties, but seldom *summo jure* exacted. And, therefore, in all forfeitures, there are divers circumstances to be considered, as, whether the tenant did it ignorantly, negligently, or as constrained through necessity. In these cases, whatsoever law in extreme justice alloweth, a good conscience forbiddeth to take advantage, though the second be worthy to suffer some smart; for negligence cannot be excused; for nature itself teacheth beasts, and they, in their manner of living, use a kind of providence. But if the forfeiture be committed wilfully or maliciously, it deserveth, in the first, little, and, in the second, less pity. Yet, where a good mind is, there lodgeth no revenge or covetous desire. And where neither of these are, there all extremities die. Yet I wish, that in these last two cases, the offenders should be punished more *in terrorem*, for example's sake, than to satisfy the greedy desire of a covetous landlord, who (though he may say, he doth no more than the law warranteth) doth yet strain a point of Christian charity, by which men are bound to measure all men's cases by a true consideration of their own. So shall he that is lord of much,

and of many manors, looking into the law of the great Lord, of whom he hath received and holdeth whatsoever he hath, find, that himself hath committed a forfeiture of all, if this high Lord should take advantage of all the trespasses and wrongs he hath done against him.

Lord. You are out of the matter, whereof your talk consisteth. I desire you not to tell me, how far I may take a forfeiture by a good conscience, but what a forfeiture is; and refer the taking and leaving the advantage, unto such as have the power to punish or forgive.

Surv. So must I, when I have spoken all I can. But I hold it not the part of an honest mind in a Surveyor, to be an instigator of the lord's extremities towards his tenants; though, I confess, he ought to do his uttermost endeavour to advance the lord's benefit in all things fit and expedient; yet ought his counsel and advice to tend no further than may maintain obedience in the tenants towards their lords, and love and favour of the lords towards their tenants, which being on all sides unfeigned, neither of them shall have just cause to complain of, or to use rigour to the other; for it is not the actor himself of any extremity, that is only to be reproved, but the abettor thereunto; and if I wist that any lord, who shall require the use of my poor travails, would expect more at my hands than the performance of my duty with a good conscience, I had rather leave than take the reward for such a travail. Neither do I find that you, howsoever you reason of this point, will commit any act toward any tenant you have, that may not be justified by the law of love; there I leave further to persuade or dissuade you herein. And, as touching the matter and manner of forfeitures, I pray you understand that they be of divers kinds, and divers ways committed; for in some manors it is lawful to do that which in others incurs a forfeiture. Forfeitures grow either by breach of a custom, as in customary or copyhold land, or of a condition or promise in a lease or grant; of which last the tenant cannot say he did not think it was so, because the meaning is expressed in his deed; but of the former, silly men may be in some sort ignorant, if they have not a custom-roll among them to lead them. But, for the most part, causes of forfeitures are apparent, and known of all within a manor; as, nonpayment of their rent; not doing his service; felling of trees upon his customary land, where custom inhibits it; letting his customary tenement fall down; alienating his copyhold land without the lord's license; committing waste; and such like; which, as I said before, are not alike in all places; and therefore it is most convenient that the customs of every manor were known, and the tenants made acquainted with them, that when question groweth for any cause of forfeiture, they may not say they knew it not; for lords commonly know better how to take advantages of such casualties, when the tenants know how to avoid them.

Lord. You speak that is reason, I confess. But may a lord enter immediately upon a forfeiture?

Surv. The forfeiture must be first presented by the homage at the next court holden for the manor, and there found and recorded, and then hath the lord power to show justice or mercy. It were inconvenient that the lord should be judge in his own cause, and his present carver of things doubtful. And therefore hath the law ordained, in all controversies, even in these inferior courts, a just manner of trial by jury.

Lord. May none but copyhold tenants forfeit their land?

Surv. I showed you before that tenants, by deed indented for life or years, may forfeit their estates; but that is by covenant or condition expressed in the deed, according to the prescript agreement made, and interchangeably confirmed between the lord and tenant.

Lord. What is an escheat? for, as I remember, that followeth in your formerly-recited perquisites of court.

Surv. Escheat is where a freeholder of a manor committeth felony, the lord, of whom his land is holden, shall have his land, and that kind of forfeiture is called escheat.

Lord. The lord may then enter immediately into this land,

because the law having tried the felony, it casteth the land upon the lord.

Surv. The King hath the use and waste thereof for a year and a day, and then cometh it unto the lord and his heirs for ever.

Lord. Is this all the causes of escheats?

Surv. Escheat may also be where a freeholder, tenant in ancient demesne, and a customary tenant of inheritance, dieth without heir general or special, and none of the blood coming to claim the same, it falleth unto the lord by way of escheat.

Lord. This, then, is immediately the lord's, and the King hath no part or time therein, and without any farther ceremony, he may enter and dispose of it at his pleasure.

Surv. It must be also first found and presented by the homage of the manor whereof it is holden, and after proclamation made to give notice unto the world, that if any man come and justly claim it, he shall be received; the homage then finding it clear, doth entitle the lord thereof, as a thing escheated for want of an heir.

Lord. You speak of an heir general or special, what difference is there?

Surv. The heir general is of the body of the deceased, and the special, of his blood or kin.

Lord. So have you satisfied me thus far; now what say you to the pleas of court? for I remember it is part of that you say before spake of.

Surv. It is true; they are parcel of the perquisites of court.

Lord. Whereof cometh the word perquisites?

Surv. Of the word *perquisiro* (as I take it), which signifies to search for, or to inquire diligently, as, also, to get or obtain.

Lord. It may well be so; for these things before rehearsed under the name of perquisites, are all casual, and not at all times alike; and therefore may be called *perquisita*, things gotten by diligent inquiry. And to that end, so many things are given by the steward to the jury of a court baron and leet in charge, that they should diligently inquire of them, find them, and present them; and yet scarcely one of forty, of the several things wherewith they are charged, are found by the jury. And some things happen at one court, that happen not again in twenty courts after; and, therefore, are also called casualties, as happening now and then, as I conceive it, having little experience in them.

Surv. Yes; it seems you have the better part of experience, namely, the receiving the profits that any way happen within the manor; some know the same, but as appertaining to others, not to themselves. Of this nature also are the profits that arise by pleas of court, which, because they are divers, and do diversely arise, there needs no long relation of them.

Lord. Are there no other perquisites of court, but such as you have already remembered, nor other profits arising to a lord of a manor?

Surv. There be many other profits that may grow also unto a lord of a manor; yet they are not certain, nor in all manors alike.

Lord. Then are they also casual; and may be called also perquisites of courts.

Surv. Casual, but not perquisites of court; yet some of them may be called *perquisita*, in some sense, because they be gotten by search and inquiry, as those that are hidden in the earth: treasures, which as long as they lie unknown, benefit not the lord; but when they are formed they are called treasure trove, as silver, gold, plate, jewels, and such like, beforetime hidden, which appertain unto the lord. So do minerals of lead, tin, copper, and such like; and quarries of stone, free-stone, slate-stones, marking stones, and all such, which may lie long undiscovered. As may also coal, lime, chalk, and such like, for which, search being made, are haply found; yet, because the benefit is uncertain upon the present, and what continuance and vent it may afford, they may pass under the name of perquisites and casualties; as may also fishing and fowling, unless the lord can bring the same to be of a certain continuing rent, then are they no more casual during the grant, but are in nature of other rents,

certain. And of these kinds, are infinite other things, incident to some manors, but not to all. As the profits of fairs and markets, wood sales, sales of heath, flags, and turbary, pannage, and such like. All which are in themselves uncertain, as touching the value, unless they be turned into a rent certain.

Lord. That, I take, is the surest way for the lord; for he that commits the dispensation of these uncertain things to bailiffs, unless they be very honest indeed, may make their bailiffs rich, and raise little profit unto themselves, as I am taught by experience, especially dwelling afar off from my manors.

Surv. Yet the lord must be wary how he lets these casual things, before he know what they are, how they rise, and what profit they may yield, how they will continue, and to whom; and upon what conditions he grants them. Otherwise he may be overtaken and much abused; for a secret benefit once let, cannot be revoked at pleasure.

Lord. You may, indeed, call these things secrets, because their validities are not suddenly apprehended or found, being in themselves novelties, which sometimes come short, sometimes exceed the hope a man hath in the value which may grow by them.

Surv. Therefore, I say, it behoveth the lord, to whom such casualties shall befall, first to make due and diligent trial by men, both of trust and experience, what may be made of any such thing by the year. For such is the wary dealing of some, that have the guiding of things of this casual nature, that they will observe the conditions and qualities, circumstances and value to themselves, and disable the thing, and extenuate the value to the lord, to bring him out of conceit with the goodness and validity thereof, to the end they may obtain a grant; as hath fallen out in many things and to many men, whose future profit of the things thus achieved hath approved the lord to be much abused. This I know by experience in the grant of a coal mine, which, as long as it was in the lord's hands, it yielded a small yearly revenue, until he, that managed the same, got a grant of the lord, and then the profit was twice quadrupled by the lessee's own confession. The like of a salmon-fishing, wherein the lord lost two parts in three, and yet at the time of the letting made to believe it was hardly worth the rent; yet would I wish the lords of manors in these casual things to be contented, after true trial made, to grant the same for a reasonable rent, though the lessee gain; for the travail and hazard in these uncertain things deserve some favour; for in receiving a rent is little toil, and as little danger, but in these kinds of things is uncertainty of profit, and assured care and labour.

Lord. I observe, by your discourse, that you seem very indifferent between the lord and tenant: I mislike it not, so you stand firm to the lord that employeth you, as right and equity requireth.

Surv. Every profession, sir, hath its defects: if they be voluntary or wilful, they are utterly intolerable, for they be either for affection or lucre. Negligent defects cannot be excused, for they proceed of the want of heed and careful industry. But, for my part, I will endeavour to discharge my duty truly, and will wade in the business, both mine eyes opened; but when I consider the lord and the tenants, I will shut them both.

Lord. Will you so? Is that all the care you will have of the lord's benefit, that payeth you for your travail? And shall the tenant be as well respected as he? I think you will hardly prove a fit Surveyor for me.

Surv. If you require other than an upright course between your tenants and you, I reverence your person, but desire not your service; for, know you this, I pray you, that as the land and the profits of it is yours, and your revenues grow by the rents, labour, and service of your tenants, your tenants have as good interest in their tenements for their rent and doing their service, as you (under your correction) have in the manor, according to the quality of the tenures; and that being saved to them, and a good conscience to me, I shall do what you will require.

Lord. It is as much as I desire; for that which I crave of you, is but to observe and report every particular thing within

the compass of your survey, whereby I may apprehend truly the full estate of my manor, as behoveth, and what commodities do arise, or may by any means lawfully be raised in the same.

Surv. If a painter should draw your picture, sir, and you having a blemish in your face, or defect in your lineaments of body, would you think he dealt truly with you if he omitted the blemish, and made your parts perfect and straight, being deformed and crooked?

Lord. I know your meaning; I like no such flattery; neither would I he should make a straight leg crooked, but true conformity in all parts.

Surv. So will I, as near as I can; for neither in quantity, quality, or value, will I, for I ought not to be partial; for these are the things wherein injury may be done to the tenants: neither will I, for I ought not conceal or counterfeit their estates, terms of years, lives, covenants or conditions, rents, services, forfeitures or offences; neither whatsoever profits, emoluments, or commodities, that may anywise arise or grow unto the lord. For a partial eye seduceth the heart, and the heart the hand, and the hand the pen, which cannot but witness against a corrupt entry of these collections, many years after the Surveyor is in his grave.

Lord. Thou speakest as an honest man, and I mislike thee not, if thy words and thy works agree. And seeing we are grown thus far, I pray thee make an end of thy whole discourse, and tell me what else appertaineth to a manor.

Surv. I have already declared the most. But manors much differ in their profits. For a manor of small quantity of land, and few tenants, may be more beneficial to the lord than a far greater.

Lord. How may that be?

Surv. Divers lordships yield extraordinary commodities, some under the earth, some of the earth, some above the earth: as tin, lead, copper, coal, stones, millstones, and such like, found under the earth, which every manor hath not.

Lord. But these are chargeable commodities to get.

Surv. So is the lord of a manor at no cost in planting, ploughing, setting, or sowing them.

Lord. That is true, but commonly the land is barren where these things are found; and therefore it is a great work of Divine Providence to yield such a commodity from under the barrenest soil, to supply the want thereof in places more fertile, of other things most behoveful for the relief of man. And yet in many of these barren places, growth by the diligent man, corn in abundance, as the Psalmist saith: "A handful of corn shall be sown upon the top of the mountain, and the fruit thereof shall shake like the trees of Lebanon." (*Psalm lxxii*, 16.)

Surv. Where diligence is and the fear of God, there, no doubt, God blesseth the labours of men, and "watereth even the highest mountains from his chambers." (*Psalm civ*, 13.) For when Israel turned to God from their idolatry, he promised, by Ezekiel, (xxxvi, 9) that "their desolate places and high mountains should be tilled and sown." "But he maketh a fruitful land barren, for the sins of them that dwell therein." (*Psalm cvii*, 34.) So that, whether God send his blessings under the earth, upon the mountains, or in the valleys, whether in grass for cattle, in herbs for the use of men, whether in wheat, oil, or vines, he truly entitleth none unto them but such as fear to offend him, and show thankfulness for them.

Lord. Though these words digress from our present matter in hand somewhat, yet it is good that both lords and tenants should know and acknowledge indeed, from whom all these good things do proceed; for although they come, some from under the earth, some of the earth, and some above the earth, they be not yet the gifts of the earth, but of God, that hath provided the earth to bring them forth to our use. But what mean you by the things of the earth? come not these of the earth?

Surv. Yes, I confess it; but some things are more perfect of themselves than others. But such as, by an extraordinary working of man's art, are made of the earth, I term things of the earth, and they also rest to the benefit of the lord of that

manor where such earth is found; as the earth whereof alum, copperas, salt-petre, glass, or other such is made, together also with fuller's earth, brick, tile, and potter's clay, which are not common.

Lord. What else is there to be considered touching the things incident to a manor?

Surv. Nothing, sir, that I now remember.

Lord. Well, I have heard all thy discourse with patience;

and indeed my desire was to hear thee in these things, and I mislike not anything in thy whole relations. But who comes yonder?

Surv. I take it, it is your tenant that lately departed from us.

Lord. So it is; I will leave you two together; fare you well; you know the places where mine occasions will draw you, and in the mean time I will make you a warrant to go in hand with it.

THE END OF THE SECOND BOOK.

THE THIRD BOOK.

THE DIALOGUE BETWEEN A FARMER (ALSO THE BAILIFF) AND A SURVEYOR.

Farmer.

YOU are happily met here again, sir; have you ever since had conference with my landlord?

Surv. Yea.

Farm. He is a man of good understanding, and very inquisitive of things of profit; and yet, to tell you truly, he is a good man to his tenants.

Surv. Love him then, for such deserve love.

Farm. He is beloved of his tenants, indeed; for they will go, and ride, and fight for him.

Surv. It is the part of good tenants, and an argument of a good landlord. But fare you well, I cannot now stay: I have been long letted by your landlord and you, and I have present business.

Farm. Are you presently to undertake the survey of my landlord's lordships?

Surv. I am now going about it.

Farm. I think it be in your choice where to begin; let me, therefore, entreat you to begin with Beauland, a manor of his here at hand, whereof I am both tenant and bailiff; and therefore I will and must attend you, and yield you my best aid, both by my travail, information, and records of the manor.

Surv. Keep you the lord's records?

Bailiff. The key is in my keeping that leads to the chest, but the key of the chest is in my lord's keeping: but I will send for it, that you may have the full view of the evidence.

Surv. So it behoveth: for a manor can never be aptly or truly surveyed without the view of the evidence, which discover from whence the original interest is derived, how it is holden, by what tenure, the customs, and other such necessary points, as not being known, the survey (though in some things may be perfect) cannot be absolute.

Bailiff. But I remember some of the evidences of this manor are in french, and some in latin, so ancient as few can read them.

Surv. They are so much the more certain, by how much the more ancient. And it is a great defect in a Surveyor if he cannot understand the french deeds, nor read nor understand the most ancient records.

Bailiff. Indeed it is necessary a Surveyor should be able to understand them, though I think few of them do.

Surv. No doubt many do, and all ought; but some lords are too curious in suffering the Surveyor to peruse them, wherein they prejudice themselves; for if they will not trust a Surveyor to see the evidence, let them never permit him to survey their lands. Is this a large manor?

Bailiff. It is spacious in circuit, and of great appearance of tenants; full of divers commodities, both under and above the earth, as also of fishing and fowling, and beareth not the name for nought: for the manor is fair, and very commodious.

Surv. Be you then my guide, and now to our business. You

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are bailiff, take this precept, and summon the tenants to make their appearance according to the purport of the same.

THE FORM OF THE PRECEPT.

BEAULAND MANERIUM.

These are to will, and in the name and behalf of A. B., the lord of this manor, to require you to give notice and warning unto all and singular the tenants of the same manor, that they, and every of them, make their personal appearance on Monday next, being the 10th of this instant June, at the place where the lord's courts of this manor are usually kept; and also to warn them, and every of them, to bring with them all such deeds, copies, leases, and other evidences, whereby they or any of them do hold, or claim to hold of the lord of this manor any land, tenements, or hereditaments; and that they then and there shew, or cause the same to be shewed unto the lord's Surveyor, at the court then and there to be holden for that purpose, and to give their further attendance as occasion of the service shall require. Whereof fail you not, etc. Dated the 3d of June, in the fourth year of the reign of our Sovereign Lord James, by the grace of God, King of Great Britain, France, and Ireland, etc.

Per I. N. Supervis.

To the bailiff of the manor of Beauland, or to his deputy.

Commonly the lords of manors do direct their own letters of warrant unto the tenants, unless the Surveyor be a known Surveyor by patent, and performeth the service when and where he thinketh most fit for the lord's use.

The order of a court baron being performed (for a Surveyor hath not power to administer an oath *ex officio*, unless he be a Surveyor by patent, or by commission, out of the Chancery or Exchequer, Duchy Court, Court of Wards, or such like) by a particular steward, or by the Surveyor, who for the time may supply the steward's office; and the charge of the court baron ended, the Surveyor may proceed to his admonition and charge, to the effect following:

First, taking note of the names of every tenant, both freeholder, copyholder, lessee, and tenant-at-will, in a paper, and a jury for the survey being empanelled, (after they be sworn,) the Surveyor may premonish them to the effect following, in words according to his own discretion:

You that have been here presently sworn to perform your uttermost duties, in all things that are and shall be given to you in charge, do, or at least you may conceive, that as the court baron (the charge whereof you have already heard) is with you ordinarily twice a year, and (if the lord will) every three weeks: this kind of court, which I have now to admonish you in, tending to the survey of the manor, happeneth not (perchance) in the time of man's age, though the lord hath power, and (no doubt) occasion to keep it oftener. You must, therefore, show yourselves so much the more diligent in this, by how much the more

seldom you are troubled therewith. And it behoveth you to call to mind, what by oath you have assumed to perform, namely, all that shall be given you in charge, whereof part hath been delivered unto you already: which being so ordinary amongst you, it must needs be more familiar than the things you have seldom heard of. And for that this business of survey stretcheth a little further than the court baron, let your due attention and examination, and faithful presentments, witness your true affections to the persons and ends to which the purpose of our present meeting at this time tendeth. The particulars inquirable are many, and of many kinds; but the persons and ends few. The first is God, in whose presence we all stand; "who loveth truth from the inward parts," that is, when the action and the will concur, and hateth dissimulation. The second is the King, whose we all are, under God; whose laws we are to follow, as well in this business as in any other: for that it tendeth to the seeking and settling of truth (the mother of true peace) between you and your lord, in giving both to you and him what is equal and just. The third is the lord of the manor, whose you are under God and the King; and therefore requireth at your hands, at this time, equal dealing, neither to discover for malice, nor to conceal any thing for favour to either party. The fourth is yourselves, whom you can in no better sort befriending in this action, than to keep your hearts and lips pure in concealing or uttering: for there is as great a danger in concealing truth, as in uttering a falsehood: and there is no such burden, as the burden of a guilty conscience, which is laid on no man but by himself. And lastly, the persons to be considered in this business are your posterities, whom your true or false relations will either help or hurt. The ends whereunto it aimeth are, first, to explain unto the lord of the manor what is his by the examination of your estates, rents, and customs, and to establish you in all things that are rightly yours: both which being duly found and duly recorded, cannot but preserve amity between you and your lord, which should be the principal end of all endeavours. And sith "God is the first and the last," and will be present in the beginning, in the middle, and in the end of all your consultations, and will be a witness for you or against you, even in your most secret counsels, set him before the eyes of your hearts: so shall you tremble to conceal truth or utter falsity, whether it be with or against yourselves or dearest friends, yea, or the lord of the manor himself; whose purpose in this service is, that the manifest truth might be confirmed, the hidden revealed, and errors abandoned. And all this lieth in you, and at your hands it is required to search, and by searching and examination to find out; and found, to deliver and present the whole, and not a part of your sincere knowledges: for from your mouths must that be taken and had, which must be recorded for the direction of your posterities, as a perpetual glass, wherein the estates of all the particulars within this manor may be at all times seen and confirmed: wherein you shall discharge your duty to God, who commands and commends truth: to the King, who by the sword of his justice maintains truth: to your landlord, who desireth only to know and have his own: to yourselves, who by this means shall possess your own in peace: and to your posterities, who by this your travail, diligence, and true information, shall partake of your sincere and faithful service, being enrolled and recorded under your names, to your perpetual commendation; whereas if you delude me, and abuse the lord of the manor that hath sent me, I, by your sinister information, may commit error, and leave it to your posterities by record; yet shall I be free of the wrong, and you shall answer it. And if you should frame any defence against the service, and plead either ignorance or show obstinacy, pretending thereby to stand dispensed of your oath, because you do it not, you deceive yourselves: for the service is so inseparably knit to your tenures, and your tenures to the lord of the manor, as deny or refuse to do the one, you forfeit the other. Howsoever some may say that they are freeholders, and they are customary tenants of inheritance, which in their conceit implieth a kind of freedom, let them not deceive

themselves their estates are conditional, as, both by their deeds and copies, they may be easily resolved by these words: "*Habendum sibi et heredibus suis*" (in the deed), "*ad voluntatem domini, secundum consuetudinem manerii*" (in the copy); in both, "*pro redditu et servitiis inde prius debiti, et de jure consuet.*" And because some of you do not (perchance) understand the meaning of these words, of your own evidences, thus they signify, that you are to hold your tenements, to you and your heirs, etc. (being of inheritance), for such rent, and doing such services, as have been heretofore due, and of right accustomed. Is not this a condition? for if you pay not the rent, or if you deny the service, you are at the lord's mercy to be compelled. I do not think, therefore, that any of you, of any discretion, will adventure the loss of his interest for not performing a service so just and reasonable at his lord's command, that tendeth also to his own benefit, and to no prejudice at all to himself or his posterity.

The end, therefore, of all mine admonition is, to move you (being a thing of common right) to show yourselves like unto yourselves, true and faithful tenants unto the lord, concurring all in one mind to do the lord this service in love, and the lord, no doubt, will recompense it with like favour, although there be no recompense due, for that which duty bindeth to be done. By this means you shall confirm your own strengths, by gaining and retaining the lord's kind countenance; and he, again, shall be the more fortified by your true affections towards him: for what a joyful thing is it for lord and tenant to dwell together in unity? Now, having thus prepared you to attention unto the matters of your charge, I will here read and explain unto you such articles as shall be for your instruction, and leave them with you in writing for your better memory; for I know, and have often found, that a bare delivery of many words, and of divers things, (as in the charges commonly given in courts baron and leet,) even to ears well prepared, may be little effectual, less to him that heareth and regardeth not, but least of all to him that will not regard or hear all. Such hearers there are of divine things, but many more of human, of this kind; but were they matters of carnal pleasure and delight, they would be both heard and practised: and therefore I the more move you, to attend unto the things which I now am to deliver unto you.

THE SUBSTANCE OF THE CHARGE OF A COURT OF SURVEY,
CONTAINED IN THE ARTICLES FOLLOWING.

BEAULAND MANOR.

1. As, no doubt, you all know, that A. B., knight, the reputed lord of this manor, is the true and undoubted owner of the same, and of all the lands, meadows, pastures, and other hereditaments within and belonging to the same; and that you, and every of you do hold your lands belonging unto this manor of him: if not, who hath the interest and right of the same, to your knowledges.

2. You shall duly and diligently set down, or shew unto the Surveyor in his perambulation of the manor, all the circuit, butts, bounds, and limits of the same, and upon what and whose manors, lordships, lands, and parishes it bordereth on all parts. And whether any confining lord or his tenants, do any where intrude or encroach upon this manor, where is it, by whom, and how much is so encroached.

As for the bounding of the manor, it is fittest to be delivered unto the Surveyor when he treads the circuit, and that the best experienced tenants accompany him for information, and some of the youth, that they may learn to know the bounds in times to come.

3. Whether there be any other manor or manors lying within the limits or circuit, or extending in part into this manor, what are the names of the manors, and who are owners of them, and how are they distinguished from this manor. And whether this manor do any way extend into, or lie within any other manor.

It is often seen that one manor lieth within another, and intermixed one with another, in such sort, as the true circuits, butts, and bounds become confounded; necessary therefore,

it is, that their distinctions should be carefully observed and recorded; for oftentimes one is devoured, or otherwise injured by the other, when lords are remiss, and tenants careless, to bring that to certainty, which is, or may become doubtful. And, especially, where many manors lie intermixed, and one man holdeth land (copy or free) of them all, there oftentimes groweth confusion, unless each part be well butted and bounded; for, though he can say how many acres he holdeth of either manor, yet he cannot distinguish the land, whereby some of the lords cannot but be abused, or the tenants wronged, as it is commonly seen and found, where one tenant holdeth confining lands of divers manors.

4. What freeholders there are within, or do belong unto and hold their land of this manor, what are their names, what land hold they, what rent pay they, by what tenure do they hold, and what service owe they to the lord.

Freeholders are of divers kinds, of divers tenures and services. And the negligence of lords in the due continuance of the substance of this article, hath bred prejudice to many; for, where freeholders dwell out of the manors whereof they hold and pay unto their lords but a small acknowledgment, as a rose, a peppercorn, a gillyflower, or some such trifle; or are to do some service at times, whereof in many years hath been no use, they have not been looked for, neither have their suits been continued for long time, insomuch that they and their tenures have grown out of memory, and their services out of use, and other lords have entitiled themselves to the land, and the right lord lost all possibilities of estate, escheat, etc. (*Littleton Ten. Tit. Socage, c. 5*), as common experience maketh more plain, by the daily questions and suits which rise, when profits apparent may grow by any of the former casualties.

And, therefore, it is most necessary to have always a true suit-roll, whereby the steward should, every court, call the freeholders by name, and to express what rent he should pay, and what services he ought to do; and that at the death of every suitor, his heir, with the land, rent, tenure, and services, would be inserted in his stead. The profit that will hereby grow unto the lord and tenants is manifest; namely, to the lord, the possibility of escheat, relief, etc., and to the tenant, a certainty of whom and how he holdeth; and this roll is to be made by the Surveyor, and to be indented, the one for the lord, the other for the tenants, upon view of every freeholder's evidence and land.

5. Whether any freeholder within or belonging to this manor, hath committed any felony or treason, and hath been thereof convicted, the lord not yet having the benefit of the forfeiture, or whether hath any such tenant died without heir general or special; if so, who hath the present use and possession of the land, and by what right; what land is it, where lieth it, how much in quantity, and of what value.

It is a great defect in a survey of a manor,—which remaineth to posterities, being enrolled or engrossed for perpetual memory,—when the Surveyor doth superficially pass over the observation of the lands of every freeholder, their tenures, quantity of land, the place where it lieth, the rent and services; for upon sundry necessary occasions, the lord is to seek in every of these, and some are worthy, because they love not to be at charge to find out and continue that which is not presently profitable.

6. Whether doth any bastard hold any land belonging to this manor, a heir unto any, what is his name, what land is it, and where lieth it, and what is it yearly worth.

A bastard, though he be known to be the son of that father that leaveth him the land, cannot inherit *jure hereditario*, but by conveyance. Neither, if he purchase land in his own name, can any inherit it after him of his supposed blood, unless he be married, and have children lawfully begotten to inherit; because it is *contra formam ecclesie*, as appeareth more at large; Merton, c. 9. For a bastard is no man's, or every man's son or daughter. Yet if a man take a wife that is with

child by another man, that was not her husband, after the child is born it shall be reputed *mulier*, and no bastard, though it be not the son of the husband.

7. What demesne lands hath the lord within or belonging to this manor, what and how much woods, underwoods, meadow, pasture, arable, moors, marshes, heaths, wastes, or sheep-walks. And what is every kind worth yearly by acre, how many sheep may the lord keep upon his walk, winter and summer, and what is a sheep-gate worth by year, and what is every acre of wood worth to be sold.

Although this article, and sundry other hereafter mentioned, be in substance enacted by a statute made anno 3 Edward I, called *Extenda Manerii*, to be inquired of by the tenants, yet it is the part and office of a Surveyor to see, examine, and judge by his own experience and knowledge, every particular, comparing the jury's presentment with his own opinion; so shall he more truly attain to the true understanding of the things he seeketh, and the more, if he discreetly feel the minds of foreign inhabitants that are ignorant of the cause of this inquisition.

8. What demesne lands hath the lord lying in the common fields of the manor, how much in every field, and every furlong, and what is an acre of ordinary field arable land worth by the year. The like you are to present touching demesne meadow, lying in any common meadow within the manor.

9. Also, you are to present the names of all your common fields; and how many furlongs are in every field and their names, and the common meadows and their names. And what beasts and sheep every tenant ought to keep upon the same, when the corn and hay is off, and what a beast-gate and sheep-gate is worth by year: also, at what time your fields and common meadows are laid open, and how are they or ought to be used. And whether is it lawful for the tenants to enclose any part of their common fields or meadows, without the license of the lord and consent of the tenants.

This article is duly to be considered, first, in setting down in certainty what every man is to keep upon the fields and common meadows; because injury is daily done by some of greatest ability to the meaner sort, in oppressing the fields with a greater number of cattle than according to a true proportion will fall unto their share; which is very extortion, and a punishment is to be inflicted upon the offenders.

Also, enclosures of common fields, or meadows in part, by such as are most powerful and mighty, without the lord's license and the tenants' assents, is more than may be permitted; the reason is, that the rest of the tenants have as much right to every herb and grass within the same, when the corn is off, as he hath that encloseth the same.

Bailiff: But, sir, if they lay it open at Lammass, or at such time as custom requireth, I think he doth neither lord nor tenants wrong.

Suro. Yes; for, first, he depriveth them both of the feed, of as much as his hedges, ditches, and enclosures take; besides, whether is it as convenient for pass and repass of cattle at one little gap or two, as when there is no estoppel at all?

Bailiff. You like not enclosures then?

Suro. I do, and I think it the most beneficial course that tenants can take to encrease their abilities; for one acre enclosed, is worth one and a half in common, if the ground be fitting thereto; and if the wastes and unprofitable commons in England were enclosed and proportionably allotted, it would feed more people by good manurance than any one shire in England.

10. What commons there are within the lordship, which do properly belong to the lord and tenants of this manor, and how are the tenants stinted, whether by the yard-land, plough-land, ox-gang, acres, or rent; how many may every tenant keep after either proportion or rate.

In this the like consideration is to be had as of the former; but that this kind of pasture is called in the statute of *Extenda Manerii* (3 E. 1), *pastura forinseca*, foreign herbage

or pasture, because no part of it is proper in any sort to any peculiar tenant, no not to the lord himself, as are the common fields and common meadows. This kind of common, or *pastura forinseca*, is in three sorts: the one is, where a manor or township having and holding their land in severalty, have by consent limited a certain parcel of ground, to lie common among them, and from the beginning have stinted every man according to a proportion between them agreed, and that is commonly by the acre, which the pasture containeth.

Another manner of such kind of common pasture is, where certain waste grounds,—one, two, or more,—lie within the manor or township, and the herd of the whole town is guided and kept by one appointed by the tenants, and at their general charge, to follow their cattle; in which kind of pasture there is also a limitation, or stint, both of the number and kinds of cattle, and this most in the north parts.

A third kind of this pasture, or common feeding, is in the lord's own woods that lie common to the tenants; as, also, common moors, or heaths, that were never arable.

In all the former commons of pasture there should be a certain stint and allotment, both to the lord and his tenants; but in this latter it seemeth that the lord should not be limited, because all these latter commons are supposed his own, and the tenants have no certain parcel thereof laid to their holdings, but only bit of mouth with their cattle; but the tenants ought to be stinted in all sorts of common, lest, as I said before, the rich devour the poor,—for the one can provide sheep and other cattle for the summer, and have enclosed pasture for the winter, or can sell again when the foreign pasture is gone; but the poor cannot do so.

Commons, again, may be distinguished into commons in gross, common appendant, common appurtenant, and common by way of neighbourhood.

Common in gross is where a man by deed granteth unto another common of pasture:—Common appendant is where a man is seized of land, to the which he hath common for such beasts as serve for composting of his land, wherein geese, goats, and hogs, are exempted; and this kind of common is by prescription as an appendix, or addition, only to arable land, and not to any other:—Common appurtenant is in the same nature, but with greater liberty, because it is for all kind of cattle, hogs, goats, etc., as for other kinds. And this common may be made at this day, and may be severed from the land to which it is appurtenant, and so cannot common appendant be:—Common by neighbourhood, is where the tenants of two lords, or more, adjoining, do enter common either upon other with all commonable cattle. But one may not put his cattle upon other's commons; if they do, an action of trespass lies.

11. Whether hath any man to your knowledges encroached any part of the lord's wastes, by enclosure, or adding any part thereof to his own land; present who hath so done, where, how much, and how long it hath continued.

This kind of encroachment is not rare, especially where great wastes and mountainous grounds are, where the lord nor his officers walk not often, and where tenants, for favour or affection, will wink at evil doers; or, for their own private lucre, commit the same error themselves, with hedges, ditches, pales, walls, sheds, etc.

12. Whether hath the lord any park, or demesne wood, which by stocking may turn to the lord's better benefit, by pasture, arable, or meadow; and what is an acre worth, one with another, the stocking; and how many acres is the wood; and what will an acre of the wood be worth; and what will an acre of land be worth by the year to be let, when the ground is stocked and cleared.

Although it be the part of the jury to yield their opinions in this case, yet it behoveth the Surveyor to have so much judgment in every of these points, as he may be able to satisfy himself and his lord, by sufficient reasons, lest he be deceived,

and the lord abused, either through ignorance or partiality. And above all, it behoveth the Surveyor to look into the nature of the soil of the wood; for there are some wood-grounds that are good for no other use,—as a dry or cold gravelly ground, whose virtue and disposition may be easily observed by the herbage.

13. Also, you must present the names of all customary tenants within, or belonging unto the manor; what messuages, tenements, or lands, they hold; and what every messuage or tenement is called; what rent it payeth; and what profit ariseth to the lord, by the death of any such customary tenant, or by the death of any freeholder, by fine, heriot, or relief, by the custom of the manor.

Commonly, these customary tenants, upon death and alienation, do pay a fine, which in some places is certain, and in some, even in the most, they are at the lord's will; and in some places they are also heriotable.

Bailiff. In this manor there be some customary tenants heriotable, and some not; how comes that? can there be two customs in one manor?

Surv. There may be so; and the reason may grow by the escheating of a manor, that had in this point a contrary custom to the manor to which it was escheated and annexed; and so the customs of either may hold under one court.

Bailiff. Your reason is good; and I take it, it may also be, that these that pay no heriots, are tenements of a newer erection, and so upon their first grants the heriots were omitted.

Surv. That is not so likely; for that if any such new erections were, they were granted in such form as other tenements, with these words: "*Habendum, etc., ad voluntatem dom. secundum consuet. manerii*"; which words do imply all duties and services which the most ancient tenements are bound unto.

There is also a copyhold estate, called ancient demesne, and the tenants, sokemains, whereof some are of frank-tenement, and some of base tenure. (*Briton. fo. 165*). Tenants of base tenure are they that hold by verge at the will of the lord, and the frank-tenement thereof is in the lord.

It is to be noted, that copyhold lands are very ancient, before the Conquest, in the Saxons' time, who called this kind of land, Folkeland, and their charter lands were called Bokeland.

14. How doth the customary land of this manor, by your custom, descend after the death of an ancestor, to the younger or elder son? And, whether will the custom of the manor allow an entail by copy; and whether doth it bear widow's estate, or whether she may have it during her life, though she marry; and whether may a man hold by the courtesy, or as long as he holds himself widower.

Surely, differences there are in sundry manors, touching the substance of this article.

The custom of some manors is, that the youngest son shall inherit, as in Borough-English; if he have not a son, his youngest brother,—as at Edmonton, in Middlesex. In Ottery St. Mary, in Devonshire, the land, which is customary of inheritance, descends to the youngest son, or youngest daughter.

In the same manor, a man that holds that kind of land in right of his wife, and she die, the husband living, he shall enjoy the land as long as he lives unmarried, though he have no issue by her. The like custom is there in a tenure called Five-acre land, and descends, likewise, to the youngest son or daughter.

In the same manor there is a tenure, called Old-Burton land, which descendeth to the eldest son or daughter, and the wife of such a tenement shall hold, during her life, though she marry. And the husband of a wife, inheritrix of that land, shall hold after the death of his wife, as long as he is unmarried.

The custom of some manors is, that all the sons and all the daughters shall inherit alike, as in Gavelkind.

The custom of some manors is, that if the tenant die

seized of five acres or under, then the youngest son shall inherit, but if above, then all the sons shall inherit.

The custom of some manor is, that neither the wife shall have dowry, neither the husband hold by courtesy. And the custom of some other manor is, that she shall have the third part of the rent,—as at Bushey, in Middlesex,—and no part of the land in dowry.

In some manors, the wife, being a virgin at the time of her marriage, shall have all the copyhold land for her frank bank, whereof her husband died seized. And many such. At Kilmersdon, in Somersetshire, the wife hath widow's estate; and if she marry, she loseth the land; but if she be found incontinent, and come into the next court riding astride upon a ram, and in open court do say unto the lord, if he be present, or to his steward, these, or words to this effect:

"For mine arses fault, I take this pain,
Therefore, my lord, let me have my land again!"—

She is by the custom to be restored unto it without further fine, doing this penance; the like hath been in Sunning, in Berkshire, and in many other manors. In the manor of Cheltenham, in Gloucestershire, there is a custom, that a man cannot marry his daughter to any man, neither can a widow marry, without the lord's license; and if a man by his wife have never so many children, and die, his widow may marry another man, and he shall carry away all the land after the death of his wife, from all the former children; and he may marry again, be he one hundred years old, with a girl of six or seven years, and she shall carry away the land from all the heirs.

Bailiff. These are foolish and unreasonable customs.

15. Whether there are any customary tenements that are heriotable, dismembered and divided into parcels, to the weakening of the tenement; and who be they that have these heriotable parcels; and what quantity hath every of them.

Although there be no immediate profit can accrue unto the lord by the presentment of the substance of this article, yet it behoveth the lord to know, who be the tenants to any part of the land belonging to an heriotable tenement, because every part continueth heriotable, and draweth unto the lord the best beast of the tenement of such land deceasing, though the land, in regard whereof he payeth it, be but an acre, and he have elsewhere free or copy, that maintaineth horse or other cattle of great value, the lord may seize the best for his heriot, due for that acre.

16. Whether are not the fines for admittances of a new customary tenant, being heir, or coming in by purchase, or upon surrender, at the will of the lord; or are the fines always certain.

This is an article whereat many tenants seem to stagger, being the nature of all men to favour themselves and their posterities, and to work so, as they may (if it be possible) make the fines certain, by looking back into times past, wherein they have found by old records, and by report of tenants before, that the fines have been certain, and so they may be in some places, though in few at this day. And it may be, former times did afford such favour, until land became of more value; but of late years, that course hath been broken, and fines become arbitrable: wherein I wish that lords and their ministers would use a mean of exacting.

17. How, and by what means, may a customary tenant forfeit his copyhold tenement, whether for felling of timber trees, ploughing up lea grounds, or meadows never tilled before, or for suffering his houses to decay, or for pulling down any houses, or for committing any other wilful waste, or devising his customary tenement or lands, for longer term than the custom of the manor will bear; or for committing any other act contrary to the custom of the manor. And whether hath any tenant of the manor offended in any of the former things, who is it, and wherein is any such offence committed.

ARCH. PUB. SOC.

Divers acts there be, whereby a tenant in one manor may forfeit his copyhold tenement, which act is no forfeiture in another manor; for customs are very different in divers manors. For in some manors a man may cut down wood and timber trees upon his copyhold land, and sell them at his pleasure, which in some manors is a forfeiture.

Some manors do allow the customary tenants of the same to let their land for three years, some for more, without the lord's license; and in some manors to let the same above a year, is a forfeiture; wherein is admitted an intolerable error in many places, namely, a tenant having let his land for a year, lets it a second, a third, etc., which is a mere deceit; for he ought to let it one year, and unless he have license, he is to take it into his hands one whole year before he let it again.

In some manors a man may let fall all his customary houses, which in some other manors is a forfeiture.

In some manors a man may not plough up, or sow, his copyhold meadow, or lea ground, that hath not been used to be tilled; in some manors contrary.

So that these kinds of forfeitures are according to the custom of every manor, which yet tenants will endeavour to wrest.

18. What are the customs of the manor in general, both in the behalf of the lord, to perform or suffer to the benefit of his tenants, and of the tenants to perform to the service of the lord.

In the beginning of every manor, there was a mutual respect of assistance between the lord,—who gave parcels of land, whether in fee or to hold at will, or upon other conditions—and the tenants of every nature, for aiding, strengthening, and defending each other; the continuance of which first proposed course, hath bred that which is now called custom, by the favour of time. And, thereby, that which at the beginning came *ex gratia domini*, is now maintained by a strong hand against the lord, and what came of a voluntary consent of service of the tenant to the lord, the lord may exact of his tenants by law; and either, in right of custom due to other, constraineth each other to do that which in the beginning was of either part voluntary.

Customs are of divers kinds, and diversely to be performed. Some, in the course of inheriting of land, some in the way of women's dowries, some in the estates of land, some in matters of forfeitures, some in works, some in rents, some in fines, some of the lord's benevolence in allowing his tenants meat, drink, money, etc., in time of their works, as these customs in several manors severally are allowed.

Manors themselves may have strange commencements and continuance, as the honour of Rayleigh, in Essex, which hath a custom court kept yearly the Wednesday next after St. Michael's day; the court is kept in the night, and without light but as the sky gives, at a little hill without the town, called the King's-hill, where the steward writes only with coals and not with ink. And many men and manors of great worth hold of the same, and do suit unto this strange court, where the steward calls them with as low a voice as possibly he may; giving no notice when he goes to the hill to keep the same court, and he that attends not is deeply amerced, if the steward will.

The title and entry of the court is as followeth, viz.—

RAYLEIGH HONOR.

Curia de domino Rege dicta, sine lege,
Tenta est ibidem, per ejusdem consuetudinem
Ante ortum solis luceat nisi Polus
Senescallus solus, scribit nisi colis.
Clamat clam pro Rege, in curia sine lege.
Et qui non cito venerit citius poenitebit,
Si venerit cum lumine errat in regimine.
Et dum sunt sine lumine capti sunt in crimine
Curia sine cura jurata de injuria.
Tenta est die Mercurii prox post festum St. Michaelis.

But for particular manors, as the customs of them are many and divers, so it behoveth every tenant to know whereunto he is bound by custom; if there be no ancient custom-roll to lead them, it behoveth the Surveyor to renew the same, wherein he is to set down every tenant's name, his tenements, lands, meadows, pastures, etc., the rent and service due for every of them, and whether works be turned into rent, and to indent the same, that the lord may have the one part and the tenants another. The neglect whereof hath bred many inconveniences, both to lords and tenants, by quarrels and suits.

19. Whether is there within this manor any villein or neif, namely, any bond-man or bond-woman; if there be, what are their names, what land do they hold and what is the same yearly worth, and what goods possess they.

Although this kind of tenure be in manner worn out of use, yet some there are, no doubt, though concealed in some manors, never enfranchised or manumised.

20. Whether hath any tenant or other person within this manor, stocked up any hedge-row, ploughed up any baulk or land share, removed any meer-stone, landmark, or other bound, between the lord's demesne and the tenant's freehold or customary land of inheritance, or between his freehold and customary land, or between this and another manor or lordship; where is any such offence committed, by whom, and where ought the same bound so removed, altered, taken away, or displaced, to stand. Solomon counselleth not to remove the ancient bounds which our fathers have made. (Proverbs, xxii, 28.)

This is a necessary article to be duly considered, because that by this means of removing or taking away meer-stones and landmarks, the lord oftentimes incurreth great prejudice; for, that when a lease of the lord's demesnes, being either a freeholder or a customary tenant of inheritance, hath land of his own adjoining unto the demesnes, or intermixed, and he take away the marks of division, leaveth the matter doubtful which is the lord's, especially where a long lease or patent is, whereby the tenant hath time to make alteration; and it is no new or strange thing to attach some by name or place, that are culpable and have yielded to reformation, being found out before their intents were fully ripe. And, above all, such are most worthy to be punished for altering any such known marks, under whatsoever pretence of ease or necessity, which is the common cloak of the mischief, used most in the King's lands, where long patents are granted.

21. What customary cottages there are within this lordship, tofts, crofts, or curtilages; what are the tenants' names, what rent pay they, and what services do they.

It is to be understood, *cottagium* signifieth as much as *casum*, a little house, or a place of abode only, or a little dwelling, whereunto little ground belongeth, but an orchard, garden, or some small toft, croft, or curtilage; but cottages of themselves are not ancient, as I take it: a toft is a little piece of land, upon which sometimes was situate a dwelling house, and, in Lincolnshire, a cottage is called a toft: a croft is a little picle or pightel, pingle, or small plot, near a dwelling house.

22. Whether there are within this manor any new tenements, or cottages, barns, walls, sheds, hovels, hedges, ditches, or such like, erected, set up, or made; or any watercourses or ponds digged upon any part of the lord's waste, without the lord's license, where is it, and by whom was it done, and by whose license, and upon what consideration.

The overmuch liberty of too many new erections breedeth sundry inconveniences, not only to a manor and the lord and tenants thereof, but to a whole commonwealth, and, therefore, not to be permitted without good consideration; although it is most convenient that the poor should have shelter and places to shroud them in, if they be found honest, virtuous, painful, and men of ability to gain their own and their families relief.

But it is observed in some parts where I have travelled, where great and spacious wastes, mountains, woods, forests,

and heaths are, that many such cottages are set up, the people given to little or no kind of labour, living very hardly with oaten bread, sour whey, and goat's milk, dwelling far from any church or chapel, and are as ignorant of God, or of any civil course of life, as the very savages amongst the infidels, in a manner which is lamentable, and fit to be reformed by the lord of the manor.

23. What tenants there are within this manor, that do hold any lands or tenements by indenture of lease: what are their names, what land hold they, for what rent, under what conditions and covenants, for what term of years, or lives.

This article is most especially to be observed, touching the covenants by view of the tenants' leases, but the jury is to find the names, and to present them with the land and rent as far as they can learn.

24. Whether hath or doth the lord employ any land to justment, as in taking in cattle to pasture and herbage: who hath the disposing of the same, what quantity of land is so disposed, and how many cattle will it pasture; and what is a cow, ox, horse, or sheep-gate worth by the year, or by the week, within this manor.

Much land is thus used in Yorkshire, and other places northward, more beneficially than to stock it.

25. Whether hath the lord of this manor any customary water-mill, wind-mill, horse-mill, grist-mill, malt-mill, walk-mill, or fulling-mill. Whether is there within this manor any other mill, iron mill, furnace or hammer, paper-mill, sawing-mill, sheer-mill, or any other kind of mill: what is it worth by the year, and in whose occupation is it.

Where sufficient rivers, brooks, stagnes, ponds, or water-courses are, there are commonly some kinds of mills, or other profitable devices, that human wit and invention hath set up for necessary uses, for the benefit of man, and for the lord's profit of the manor, where such devices are erected. And yet all kinds of devices are not convenient in all places: as where no lead, tin, or coal is, there is no need of the use of water, to move a wheel, to blow the fire for the melting and trying thereof; yet there may be like use for iron ore, and where neither of them is, there may be use of walk-mills, or fulling-mills: and where those are not, yet there may be use of corn-mills, and such like. And in some places the force of water-courses is used to raise water out of one place into another, where the natural current denieth the coming, and mounting thereof; with infinite other devices, according to the situation of the place, and necessity of the thing required. Which, though they be not all mills to grind corn, yet may they bring profit to the lord, which is the thing the Surveyor should covet, not only to observe what is already, but must have also some judgment to erect some, if the water-course will conveniently afford the same to increase the lord's revenues.

To the corn-mill, which are custom mills, doth belong a kind of duty from the tenants, that is, that they are bound to grind their corn at the lord's mill: and that kind of custom is called socome.

Bailiff. Must a customary tenant of a manor, where such a mill is, be forced to grind all the corn he spendeth in his house, at the lord's mill?

Surv. Of necessity, if it grow upon the manor; or else the lord may amerce him for his fault.

Bailiff. What if he be forced to buy it in the market?

Surv. Surely then it is a question, whether he be bound to grind it there or not. But I take it, he is at liberty to grind it where he will, even where he finds himself best served. For there is bond-socome, that is, where the tenant is bound by custom; and love-socome where he grindeth of free-will.

Bailiff. We that are tenants would be glad if you could tell us, what toll our miller may take; for we are much abused in it, as we think; and because we be bound by custom, we cannot conveniently leave the mill, yet we find no remedy of the miller's abuses.

Surv. As touching toll (which word cometh of the verb *tollo*, to take away, as it seemeth), there are so many differences, by grants made by lords of manors, that the certainty in general can hardly be declared. Some millers take a twentieth, some four-and-twentieth part; tenants at will should pay a sixteenth part, and a bond-tenant a twelfth part, and some are toll-free. But howsoever the toll be, fear not, the miller will be no loser: and for his abuses, you have your remedy in the lord's court, or at the common law.

26. Whether hath the lord of the manor any peculiar fishing within any river, brook, mere, stagne, pond, or other water: where and how far doth it extend, and what it is yearly worth, and who be farmers thereunto, and what common fishings are therein, and how is the same used.

As this article is little needful to be propounded in manors where no rivers of sufficient waters are for fishing: so it is very necessary to be examined, where such waters are. For it is daily observed, that many abuses are committed against the lord himself, by such as usurp his peculiar fishing, and against the commonwealth, in destroying fish, as appeareth by the punishment ordained against offenders therein, (25 *Hen.* 8, c. 7, and 31 *Hen.* 8, c. 2). Therefore it behoveth the Surveyor to be more careful in seeking the means how to raise a profit unto the lord by his fishing, than to find the present abuses which are inquirable, and punishable at every leet, although, if any apparent offenders be found, he is to advertise the lord for reformation; but not inroll the same in his book of survey. For nothing is therein to be inserted, but matter of perpetuity, in recommending the present state of the manor unto posterities, and for the lord's immediate use: the court rolls of the manor do shew the abuses and punishments in those kinds. And therefore, besides the ordinary fishing in small land rivers, brooks, and ponds, there must be also remembered what profit may arise by fishing in the sea, if the manor be near it, or any creek thereof, in oysters, muscles, cockles, crabs, crayfishes, and such like.

27. Whether hath the lord of the manor any fowling within this manor, by means of any moors, marshes, waters, brooks, reeds, or such like: as of duck, mallard, widgeon, teal, wild-goose, bustard, plover, bittern, swan, or such like fowl; or any woods wherein do breed any herons, shovellers, storks, or such like; or any pebble, beach, or sea-bank, wherein breed sea-pies, olives, pewits, or such; who taketh the profit of them, and what are they, or may they be worth by the year, unto the lord.

These kinds of commodities are not in every manor; and, therefore, as in all other things, it behoveth the Surveyor to consider of these particulars, and give no more unto the jury to be inquired of, then he either knoweth to be inquirable, or likely by examination to be found in the manor he intendeth to survey, yet not to omit any whereby the lord's revenues may be increased, nor to trouble the jury with needless articles.

28. Whether hath not the lord of this manor (time out of mind) had and received all waifs, estrays, felon's goods, treasure found, within the manor, and such like profits, and whether hath he been answered of them from time to time truly, or not, and who is the officer that oversees and takes notice of the same to the lord's use, and whether they be totally and fully answered.

Although these kinds of profits may redound unto the lord by prescription, yet most commonly they are confirmed by charter, and therefore the lord's evidences, together with the use, must be examined, as also how and by whom these casualties are priced, wherein lords are often abused.

29. Whether there are within this manor, any tin-mines, lead-mines, copper-mines, coal-mines, quarries of stone, of marble, free-stones, mill-stones, lime-stones, grinding-stones, marl, or chalk-pits, slimy or moorish earth, fit for sowing of land, or any potters' clay, clay for brick or tile, or any fuller's earth, or any sand, or gravel-pits, or such kind of commodities, and what

is every such kind worth to the lord, or may be worth by year.

These are casualties, and seldom or never happen in any manor together; and few manors but have some or one of them, which may be very beneficial to the lord, if the Surveyor be willing and skilful to advantage the lord.

30. Whether hath the lord of the manor any bushes, turfs, peats, heath, broom, furze, fern, or flag, which are, or may be, yearly sold within the manor, and what may they yield the lord by year, if they were improved to the uttermost value.

These things are not in every country, much less in every manor, for I think Essex can afford little of them, unless it be of turfs and peats, if they were sought in some low grounds in some creek of the sea. Northumberland, Westmoreland, and those wild fells, yield store of peats and turfs: so doth Lincolnshire, Cambridgeshire, Yorkshire, Lancashire, and other places, many within this kingdom, which would be very profitable, make good fuel, and save much wood.

Bailiff. What mean you by turfs and peats?—are they not heath turfs you mean?

Surv. There are heath turfs, which are also meant in this article, but the turf and peat is of another kind: for they are taken in bogs, and such rotten grounds as cattle cannot feed upon. And those that are first cut up, are called turfs of the upper part, and such as are taken downward, are called peats.

Bailiff. How mean you downward?

Surv. Under the first cut; for you may cut a spear's length deep in some places in the summer time, and that kind of earth will burn very excellently. And if it be cut never so deep, it will fill again in a few years, and then may it be digged again; inasmuch that the profit will be continual to the lord, and the use to the country.

Bailiff. Then it is beneficial ground.

Surv. So it is; and I think there be many grounds would serve to this purpose, if they were sought out, where scarcity of other fuel is. But there is no greater enemy to thrift than idleness, and ignorance of things of use not in use. For in many places, such is the scarcity of wood and furze, as they are enforced to burn cow-dung.

Bailiff. That is a strange fuel; as for furze, I take that to be no good fuel, but to brew or bake withal, it maketh only a flame as doth stubble or straw.

Surv. Yes; it is good fire-wood in Devonshire and Cornwall, where they make great profit in vending it for that use, in many of the greatest towns, and in Exeter especially.

Bailiff. Then are they better than our ordinary furze about us?

Surv. The country people do call them French furze; they have a very great stalk, and grow very high, and their prickle very strong; but that they grow thick, and the body is commonly bare to the top, where is only a green bush of the tender and small branches, and seldom elsewhere, so that they easily make them into faggots, and so vend them with great profit.

31. Whether is there within the manor any slate-stones for tiling, red or black lead, or ochre for marking-stones.

These kind of slate-stones are full in Cornwall, and the marking-stones most about Derbyshire, and those parts northward, as are also mill-stones about the Peak.

32. What deer hath the lord of this manor in his park, red or fallow; how many of antler, and how many rascal; who is keeper, and what is his fee by year; whether hath he any warren of conies or hare; who is the keeper of either of them, and what fee hath he by year, and what is the warren of conies worth by year, and what were the park worth by acre to be let by year, if the deer were destroyed, and how many acres are there within the pale.

A park for deer is more for the pleasure, than for the profit of the lord or commonwealth, and yet fit that princes and men of worth should maintain them at their pleasures,—yet not so fit, that every man that listed should maintain that game, for his private pleasure, that depriveth a commonwealth of more

necessary commodities. But men of late are grown more considerate, and have dis-parked much of this kind of ground, and converted it to better uses. As for warrens of conies, they are not unnecessary, and they require no rich ground to feed in, but mean pasture and craggy grounds are fittest for them. It is therefore in the discretion of a good and circum-spect Surveyor, to advise his lord how to dispose of these things for his best advantage. And in craggy and unprofit-able grounds to keep goats, especially where they may not annoy profitable things.

33. What pensions, portions, payments, or fees, are, or ought to be, yearly paid out of this manor; to whom are they paid, and for what; and what rent or annuity is there paid, or ought yearly to be paid, out of any manor, or by any person, unto the lord of this manor; and whether hath the same been duly paid, or discontinued; what is the annuity or rent; by whom ought it to be paid, for what thing, and how long hath it been discontinued.

These things are very duly to be examined, both which go out of a manor, or be paid to a manor, although, in many places, they be much neglected,—not in calling for, I confess; but if such payments be denied, the lord, to whom such things are due, can hardly say or avow for what, or in con-sideration whereof, they are due. And by that means men lose their right, both of the payment, and sometimes of the land, if it be escheat; yea, whole manors sometimes.

34. Whether is there within this manor any market, weekly, or fair, at any time of the year kept; on what day or days; who hath the toll and profits of the same; and what is it, or may it be, worth unto the lord by year; whether in his own hands, or let to farm, and for what rent.

Fairs and markets are commonly by patent from the King, and consequently the toll standings and stallages.

35. Whether doth the lord, or may he, take in any swine to pannage yearly into his park or woods, what is the pannage worth by year.

Bailiff. Sir, you need little to inquire of that; for oaks and beech, that have been formerly very famous in many parts of this kingdom, for feeding the farmers' venison, are fallen to the ground and gone, and their places are scarcely known where they stood. "*Jam seges est ubi quercus erat.*"

Surr. It is very true; and it is pity that lords of the manors have no more care of their posterities. For assuredly there will be greater want of timber, in time to come, in this realm, than may be supplied, with little charge, from any part else whatso-ever. And therefore might lords and farmers easily add some supply, of future hope, in setting, for every twenty acres of other land, one acre of acorns, which would come to be good timber in his son's age; especially where there is, and like to be, more want.

Bailiff. The course were good; but you prefix too short a time far, for oaks are slow of growth, and it will be long ere they come to be timber.

Surr. I know, in Suffolk, where, in twenty years, acorns have yielded fruit already, nearly as high as a steeple of ordinary height.

Bailiff. Truly it is pity it were not enjoined to men of ability and land to do it. But I think men imagine there will be timber enough to the end of the world, as many things else presage it cannot stand long.

36. Whether hath not the lord leet and law day within the manor, which is the extent of the precinct; and whether is there not a court kept within the manor from three weeks to three weeks, and what sum or value hath the court power to deter-mine.

Bailiff. If leets and views of frank-pledge were duly kept, and the true meaning of the first creation of them, and their powers duly executed, they would reform many abuses in the commonwealth.

Surr. It is true; but the negligence of lords, and corruption

of stewards, have much impeached both the credit and use of those most necessary courts.

37. Whether hath any of you any deeds, evidences, court-rolls, rentals, suit-rolls, custom-rolls, books of survey, accounts, or any other escripts, or muniments, touching or concerning this manor. If you have any such, produce them at this court, for the lord's use and service; or if you know any that have any such, deliver their names, that the lord may procure them, to show the same.

Men that have such are nice in delivering them; but if they have them, and conceal them, they are no good tenants in not revealing them; and, without records, there can hardly be a good survey.

38. Who hath the advowson, nomination, presentation, and gift of the parsonage, vicarage, or free-chapel, whereunto this manor belongeth; or whether is it an impropriation belonging to the lord of this manor; who is incumbent of the parsonage or vicarage, or who hath the impropriation in use, and what is it worth by year.

Some have taken and set down a parsonage or vicarage to be parcel of a manor; but I take it otherwise, for a matter of spiritual or ecclesiastical function cannot be parcel of a secular living. But a manor, as touching the tithe, may belong to an ecclesiastical charge; neither do I think that an impropriation, though it belong unto the lord, yet is it not parcel of his manor; because that, *ab origine*, even from the first institu-tion, it was dedicated to a spiritual office. And although the profits were afterwards disposed to a secular person, yet are not the profits parcel of the manor.

39. Whether is there any land concealed, or rent detained, within this manor; and by whom, for what, how much, how long; or whether is any land granted in mortmain.

40. Who is the lord's bailiff, what is his name, what yearly fee hath he, and whether hath he a patent for life, or is at the lord's will; and who is steward of the lord's courts, what is his fee, and whether doth he hold it by patent, or at will; who is woodward; and what other officers are there within, or belong-ing to, this manor, and what are their fees.

Sundry manors have sundry officers: some of the lords' election and appointment, and some of the tenants', among whom there are yearly chosen, as Hayward, Reeves, etc.

41. Within what diocese and deanery, within what division and hundred lieth this manor, and to what place are you that are the tenants usually called to do your services, to muster, and to shew your armour and weapons; and what beacons are you appointed to watch and ward at.

It were a simple part of a Surveyor, if his lord should ask him these questions, and he should answer, I cannot tell; and yet are they things fit for the lord to be acquainted with upon sundry occasions.

42. What market towns are nearest unto this manor, and what commodities are there especially vented at every of them.

This is also necessary to be known of the lord that dwelleth remote from his manors, for many reasons. Thus much for the charge.

Every Surveyor is in discretion to order his own business, and none is tied to this method of charge; yet he must take the substance of these articles, or such and so many of them, as in his conceit (guided by some foreknowledge of the state of the manor which he is to survey) are fittest to be delivered unto the jury; and, withall, he is to explain unto them the sense and meaning of every article more at large than he will give them in the letter. And, having thus finished the charge, I hold it fit to give the articles in writing unto the jury, to the end they may answer their knowledges to every of them in writing. And because the jury, perchance, cannot so methodically set down their own plain meanings as is fit to be engrossed in the lord's book, the Surveyor must correct the same, still keeping himself within the compass of the meaning of the jury, and then to read

the same unto them distinctly, that they may allow or disallow the same; and because they shall have sufficient time to consult and deliberate upon every article, they may have day given them, until such time as the Surveyor doth think he shall finish the perambulation and view of the manor in such sort as he intendeth, and then to take their verdict, and accordingly to engross the same, together with his own private necessary observations touching the same.

Immediately after the charge thus ended, the Surveyor is to make proclamation in the name of the lord of the manor, that every tenant do presently produce his deeds, copies, leases, and other evidences, to the end that the Surveyor, and his clerk, may enter them roughly in a book; and afterward enrol them fair in a book of parchment for continuance.

And if any man make default, he may find it by the catalogue of the names of the tenants, which he must take at the beginning of the court, and cross them as they bring their evidences to be entered; the manner of which entries doth briefly follow:—

BEAULAND MANERIUM.

Intrationes omnium et singularium Chartarum, copiarum, indenturarum, omniumque aliarum Evident. tenentium, ibidem facta tertio die Novemb. anno Regni Domini nostri Jacobi, Dei gratia, Magnae Britanniae, Franciae et Hiberniae Regis, fidei defensoris, etc. A. ut sequuntur, viz.

CHARTÆ LIBERORUM TENENTIUM.

W. P. de F. Com. M. geoman, per chartam dat. tertio die Martii, anno regni Hen. 7. secundo, tenet libere sibi et heredibus suis (if it be entailed, then according to the limitation) ex donat. R. S. unum mesuagium sive tentm. vocat. Whylocks, situat. in quadam venella vocat. Potters-street, inter mesuag. R. L. ex austr. et quadam viam vocat. Love-lane ex parte Bor. abutunt. super magnam communiam vocat. Hownes-moore in Occiden. et super com. campum vocat. Beggars Bushfield in Orientem, et continet in longitudine quadragint. pertic. et in latitudine novem pertic. et dimid. unum ctm. prati. vocat. Mosse-meadow, cont. per estimat. quinque acr. et quinque acr. prat. jac. in commun. prat. vocat. Colliers-mead, et tres clausur. terre arabilis insimul jacent. vocat. Bathes, cont. in se in to. per estimat. decem acr. unum ctm. pastur. vocat. Abbots-close, jacent. etc. cont. per estimat. tres acr. Quod quidem mesuagium proad. R. S. nuper perquisivit, de quodam A.B. habend. etc. per redd. unius libr. Piperis, et per servic. inde debet. et consuet.

In hac forma ceteræ omnes irrotulentur chartæ, secundum particularia in eisdem specificata.

COPIARUM CUSTUMARIORUM TENENTIUM, INTRATIO.

B. C. per cop. Cur. dat. nono die Maii an. regni Elizab. 30. tenet exsursum redditione. W. R. unum tentm. jacent. in quadam vico vocat. Church-street, int. etc. (according to the buttals) et unam ctm. terræ voc. Heywood jac. etc. cont. per estimat. duas acr. unum pratum vocat. Deare-meade, cont. quinque acr. et decem. acr. terr. in com. campis. Habendum sibi et hered. suis ad voluntatem domini secundum consuetudinem manerii, et dedit domino pro fine £3. 6s. 8d. et reddit per annum.

If the estates be for lives, as in the most manors in the west, then the entries of the copies must be according to the words of the copy; and at the foot of the entry of every copy, it is fit to set down the ages of the tenant in possession, and of them in reversion.

Also it behoveth a Surveyor, in the entry of all deeds and copies, to set down the names of all messuages and tenements, and the names of every particular close and parcel of land as they are set down in the copy. And not only the present tenants, but two, three, or four descents, if it be expressed in the copies.

It is a fault in some stewards, that, in making out copies, do

set only down the name of him that surrenders, and the name of him to whom the surrender is made, without further relation of any former tenant's name; and do also set down the messuage, without setting down the particular parcels of land belonging unto it, the rent or fine, using only general words, which in all things import uncertainty. Whereas, if he did well, he should observe and set down every parcel both in quality and quantity; namely, what is meadow, pasture, arable, wood, etc., with the principal butts and bounds, by the Surveyor's book. But for want of true surveys many beneficial things are omitted, and many hurtful admitted.

DE INTRATIONE DIMISSIONUM, SIVE INDENTURARUM IN QUIBUS EA QUÆ SEQUUNTUR OBSERVANDA SUNT PRÆCIPUE.

Dies, mensis, et annus.

Partes, inter quas facta est indentura.

Consideratio concessionis.

Particularia quæ per indenturam traduntur.

Habendum, cum termino annorum aut vitarum, pro quo aut quibus conceduntur.

Redditus, et tempora solutionis.

Clausula districtionis, aut foris facturæ.

Conventiones, et provisiones breviter, sed distincte.

Quomodo obligatur ad warrantandum concessor, etc.

This sufficeth for the form of the entry of deeds, copies, and leases.

Bailiff. Is this all that is required in the making up of a book of survey?

Sure. Some think it sufficient to come into a manor and to call the tenants, and to cause them to shew their evidences, and to enter them, and so to give the lord a book of the estates, and think they have done a great work; which is as much as if a caterer should provide meat, and the cook to send it to the table raw for his lord to eat. The caterer's office doth as much towards the lord's diet, as the bare knowledge of the estates of a manor doth towards the performing of an absolute survey. Yet is the caterer's office a good inducement, and without his provision the cook can do nothing; and without the knowledge of the estates a Surveyor's travail is to little purpose.

Bailiff. Yet you will enter every man's particular lands again, will you not, notwithstanding the entering of their evidences?

Sure. It must be so, after the view had and made of all the manor.

Bailiff. What else require you at my hands to be done then at this time? for I perceive you have given the jury their charge, and limited them a day to bring in their verdict: and you have seen and entered all the deeds, copies, and leases of the tenants which have appeared. What will you now do in the mean time?

Sure. I must now command you (the lord's bailiff) to appoint me some sufficient tenants to accompany me in the perambulation and description of the manor.

Bailiff. What, will you make a plot of the manor?

Sure. Yes; for it is very expedient and necessary for many causes, which I shewed you in our first conference.

Bailiff. I pray you let us proceed in our intended business; we have company sufficient both for your instruction of every man's land, and to aid you to carry the chain; as for your instrument, I will carry it. Is it much material where you begin?

Sure. Truly no; yet I hold it most fit to begin about the middle of the manor; and then to take a course, as the convenient lying of the land will move us, or at one end or side, all is one.

Bailiff. Then I think here is a convenient place to begin the business; here is a spacious waste, and near about the middle of the manor.

Sure. What call you this common?

Bailiff. Ye that are tenants, and are sworn, inform the Surveyor.

Jury. Sir, it is called Water-hurst-common.

Sure. What field call you this?

Jury. Ox-lease.

Surv. Whose is it?

Jury. Thomas Turner's.

Surv. How doth he hold it?

Jury. He holds it by copy of court-roll.

Surv. It is meadow?

Jury. Yea; as we call it, Upland-meadows.

Bailiff. I perceive you write the names of the commons and closes you take, and the name of the owners and occupiers, and the quality of the ground, and how it is held in every particular close.

Surv. I must of necessity do so; for memory may not be trusted to retain so many things, as are to be noted in this business.

Bailiff. I pray you proceed to the rest.

Surv. What river call you this?

Bailiff. Will you have the names of the rivers too?

Surv. Yea, and the name of every other particular else whatsoever; for it is very material whether it be river, brook, lane, highway, cross, tree, pond, hill, hedge, corner, gate, stile, gravel, or sand-pit, meer-stones, baulkes, land-shares, or any matter or thing memorable, because they are often mentioned in records, butts, boundaries, deeds, copies, leases, and to distinguish between land and land, manor and manor, parish and parish, and such like.

Bailiff. Indeed, I perceive it is very material to remember them all; this river is called Otter-brook, and is indeed the bounds between this manor of Beauland and the next manor.

Surv. What call you the next manor, on the other side the river?

Bailiff. The manor of Littleton. But will you observe the names of all the manors that border upon this manor?

Surv. Yea, of necessity, and whose manor it is; for it were a simple part in me to take the circuit of this manor, and if the lord should ask me what manors lay about it, I should answer I cannot tell. It is fit the lord should know who are his neighbour lords, and what manors were near him. Whose is the manor of Littleton?

Bailiff. The King's manor; and, therefore, whether you may boldly set it down, you may be advised.

Surv. There is no fear where is no purpose of offence, and in this, it is not only not offensive, but expedient that the true bounds, meers, and marks of division between manor and manors should be observed and set down, that either may know how far his own extendeth. But what house is this?

Bailiff. These men of the jury will tell you better than I; for I am but a stranger here to speak of, and I dare not be too bold to speak either by guess or by report, of things which must be recorded to posterities.

Surv. You do better to forbear, and to be silent indeed, than to speak what may lead us into error, as many busy and forward fellows do, to the hurt sometimes to the lord, sometimes of the tenant. And some Surveyor, over-credulous, will take their raw reports for matter of record, and so leave doubts or untruths to them that shall come after. But what say you that have been sworn?

Jury. The name of the house is Fullers; but why it is so called, we cannot tell.

Surv. It is so called (no doubt) of some former tenant of that name; for houses and farms are oftentimes called of sundry names, according to the variety of the tenants' names; and it is a good course to set down all the ancient names of a farm, because in ancient records names are found both of farms and closes, and such like, that are out of knowledge, for want of the continuance of expressing them in their copies, deeds, leases, rentals, suit rolls, and custom rolls. But whose is the house now?

Jury. It is now in the tenure of William Sands.

Surv. How doth he hold it?

Jury. By lease, for twenty-one years.

Surv. When I come to any of the land that belongeth to this house, let me understand it; for it is convenient to men-

tion, in setting down every piece of ground, to what house, farm, or tenement, it belongeth.

Bailiff. Here you are now come to the lord's wood.

Surv. What call you this wood?

Bailiff. I take it, it is called Frith-wood.

Surv. It is parcel of the lord's demesnes, is it not?

Jury. It is so, sir.

Surv. Here are good timber trees, we will number them.

Bailiff. Number them? how is it possible to number them; they are so many, and stand so thick?

Surv. I confess (especially if it be thick of bushes and under-wood), there is difficulty in numbering them.

Bailiff. To what end is it; what is the lord the better, to know the number of the trees?

Surv. Howsoever the lord be pleased to think of the service, a Surveyor ought to know it; that when he shall be demanded of the lord, what he thinketh the wood to be worth if to be sold, he may be able to answer it, and give a reason for that he saith; and not to speak at random, or by guess, without some ground of reason or proof. For how can a man value a wood, when he knows not what crop it beareth? For a wood may have an hundred trees in an acre; some woods not twenty; some not five; and, therefore, it were great negligence in a Surveyor that would pass by a wood of the lord's and would not take note of the trees, yea, and of the reasonable value of them one with another, that he may readily be able to satisfy the lord when he shall demand the Surveyor's opinion, though he cannot answer precisely, yet near.

Bailiff. You say truly; but what if there be no trees at all in the wood; as here is a wood adjoining, called Buck's-grove, that hath the name of a wood, but hath no trees at all?

Surv. Then is it underwood which must be considered in another kind, for there is difference between timber trees and underwoods; for an acre of timber trees may be worth forty pounds, and far more, or much less; when an acre of underwoods cannot lightly exceed five pounds, and may not be worth twenty shillings. Therefore, must a Surveyor be heedful, I say, to note what trees are among the underwoods, and must also have skill to judge of the values of the trees,—namely, to judge what a ton of timber, or a load, is worth, and how many loads a tree will make. And because this is not alike in all places, he must be careful to observe the plenty or scarcity, the use and little use of timber or fire-wood, in the place where he is to deal, and, accordingly, in discretion to judge of the values of that he hath in hand, else may he deceive himself and his lord much, if he prize wood in the weald of Sussex as it is worth about Salisbury Plain.

Bailiff. Saving your speech, the like is to be considered in the letting and sale of land.

Surv. Some there is; more in opinion than in deed; for the difference of prices of land of like quality cannot be so great in several places; for land that will yield per acre, like feeding in pasture, burden of hay, or profit in tilling, will yield like maintenance of families of equal companies; and, therefore, in reason, the difference of yearly values of land of like quality differ not much.

Bailiff. In reason, indeed, the difference should not be great, yet is commonly valued according to the vent of commodities: but let this pass.

Surv. We have had a good walk between these two stations, and a long discourse. But, methinks, I see a quarry of very good stone here.

Bailiff. Yea, sir, here is both excellent free-stone and good marble; and as we shall go, you shall find divers sorts of minerals and earths; which you cannot note upon your plot, because they are things hidden under the earth.

Surv. Yea, but I will (for so I ought) set down in the plot the place where every of these commodities are found. But for the matter and substance, and the profit and value, I know the jury will bring in their verdict, for they are all given them in

charge, and as I shall find in mine own opinion, I will likewise compare with the jury's, and so set it down for the lord's instruction.

Bailiff. These things are necessarily given in charge. But here is a mill, sir; will you take note of it upon your plot?

Surv. In any case; for it is not the least ornament of a manor, a fair stream, and a well-conditioned and well-wrought mill, upon the same. In whose use or occupation is this mill?

Bailiff. It is one G. Johnson's.

Surv. By what right?

Bailiff. Let them of the jury speak.

Jury. He holdeth it freely for a pepper-corn a-year. But it was parcel of the lord's demesnes, but he sold it; and it was a custom mill, very profitable.

Surv. He that persuaded the lord to sell away his custom mill, had little respect to the lord's profit or royalty; the profit comes easily, and the custom confirmeth the antiquity of the manor: and such a member of a manor I would wish none to put away. But humour and necessity are two opposite emperors: the one commands, willet, and doth what he listeth; the other is forced to do what it would not. And, therefore, men that may do what they list, and will do what they may, if they err to their own hurt, are not to be lamented. But they that are constrained to do what they would not to their prejudice, I pity them. But, I take it, we have near trodden the whole manor.

Bailiff. Almost, indeed. Here are some few closes more, and then an end.

Surv. But here are certain cottages, methinks, builded upon the lord's waste.

Bailiff. Yea; but let them pass, never meddle with them; for they are only shelter for poor people, and yield the lord little or no commodity; and therefore spare labour of observing them.

Surv. Nay; it is a parcel of my task; I must omit nothing that may inform or benefit the lord.

Bailiff. Be it then as you will.

Surv. What, are we now at an end?

Bailiff. Yonder corner is the last; for it is the place where you began, in Water-hurst Common.

Surv. So: then we will retire.

Bailiff. What will you then command to be done?

Surv. Cause the tenants all to appear, and let the jury bring in their verdict.

Bailiff. The tenants are at the Court-house, and the jury ready with their presentment.

Surv. I will go with you and take it. Make proclamation, and call the jury by poll.

Bailiff. They all appear.

Surv. You, sworn-men of the court of survey, have you agreed upon the answer of the articles that were given you in charge; and are you provided with answer unto every of them in writing?

Jury. Yes, sir; here it is, fairly written.

Surv. You have well done in your endeavours, though, perad-

venture, there may be defects in the form of your answers; yet, if you have observed the main purpose, which is the seeking out and the delivering the truth, you have discharged the parts of honest tenants, and men fearing God. And because that it may be, some things may be omitted, which you may not instantly call to mind, blush not to declare it here, before you be deprived of that you have written; for this paper I must have, and that under your hands.

Jury. What need we set to our hands?

Surv. Because, if I err from it, your hands shall testify against me; if you have erred, and I err through you, your hands shall justify me.

Jury. The thing is reasonable; we will subscribe.

Surv. Now will I read the articles of your charge, and, to every article, your answer, that you may yet correct or add what shall be thought fit; and therefore, I pray you, listen.

Jury. Read you, sir.

Surv. You agree to all these things willingly, whereunto you have set your hands.

Jury. We do so, and do here confirm it by the delivery thereof, by our foreman, in the name of us all, to the behoof of our lord. And what you else require at our hands, we are ready to perform.

Surv. You do kindly, and like dutiful tenants: and be you assured that your forwardness herein shall not be concealed from the lord; but with true report of your endeavours for the furthering of the business, which cannot but draw a kind consideration from the lord again to you: which, both to gain for you, and to retain it, I will truly do my best. And so, for this time, I will leave to trouble you further, until I have set my other collections, which I have taken in the perambulation of the manor, in some order; then will I be bold to trouble you again, to the end that you may all approve what is done, whether I have truly set down the particulars: namely, the lord's demesnes, the free, copy, and leased lands, under their true names and due owners; if not, that, by your help, I may reform it before I engross it to continue to your children. For what we do, will be hereafter a light unto them that shall come after you; and if it should be erroneous, it would be prejudicial to your posterities.

Jury. I pray you, therefore, let there be an examination; and we will gladly give both our attendance, and best aid, to perfect it.

Bailiff. I shall then make an "O yes," and adjourn the court until they have notice again.

Surv. Do so.

Bailiff. You will now keep your chamber until you have made your collections perfect, and cast up the land.

Surv. I purpose so.

Bailiff. I would gladly see the manner of your casting up of the acres, as you do it; for the rest, I shall see when you have done. For the jury's examination, I will leave you till the morning, and then will I come to your chamber.

Surv. Do so.

THE END OF THE THIRD BOOK.

[Towards the end of the second book, several passages concerning wardship, advowsons, and villanage; as also in the third book, several concerning the instruments and manner of surveying, are omitted, the last edition having been followed.]

THE FOURTH BOOK.

THE DIALOGUE BETWEEN A BAILIFF AND A SURVEYOR.

THE FIFTH BOOK.

THE DIALOGUE BETWEEN A BAILIFF AND A SURVEYOR.

[These two books, as will be seen in the table of contents, are not of sufficient interest to be inserted.]

THE SIXTH BOOK.

THE DIALOGUE BETWEEN A PURCHASER OF LAND AND A SURVEYOR.

Purchaser.

SIR, as I take it, you did survey a manor wherein I dwell, called the manor of Beauland?

Surveyor. I did survey a manor of that name, indeed.

Purch. It may be you have forgotten me, yet I was one of your jury of survey there, and I did accompany you in your perambulation of the manor; and I remember the bailiff, among many other questions, demanded you one, wherein I would have been glad to have had your opinion, but that you had no fit opportunity, at that time, to give such satisfaction as I did wish.

Sure. What, I pray you, was the question?

Purch. Whether it were better for a man that had money in his purse, a thousand marks or a thousand pounds, and could lay it out upon land, to purchase a fee-simple or to buy a lease?

Sure. I can hardly admit leisure to answer you, by reason of other occasions; but, in regard of former acquaintance, to do you a pleasure, I will borrow so much time as may afford consideration to answer this question; so you can be satisfied with some brief reasons, although I know that such are the different opinions of men in this point, as that which will fully satisfy one, will draw some others into doubt, as we see in divers other like cases:—*Multa capita, multae sententiae.*

Purch. I confess my judgment is mean in this point, because I have not had hitherto any practice in the purchase of land, and I must also confess that I am not provided for that business as some great masters, who can undergo matters of many thousands; yet I think it in my discretion, as fit to be well advised in the smallest as in matters of greatest moment; for a little, well employed, may prove so far more beneficial than a greater portion, by how much the same is laid out with more discretion and better judgment. And though, to tell you truly, my stock will not exceed a thousand marks, yet would I gladly bestow it upon such a thing as I might live thereby, and my children after me.

Sure. Then I perceive you would deal with some matter of perpetuity?

Purch. I mean some fee-simple; for, you know, it is a good matter to be a freeholder: it is a quietness to a man's mind to dwell upon his own, and to know his heir certain. And, indeed, I see that men are best reputed of, that are seized of matter of inheritance. Leases are but of base account; for they have oftentimes their livings taken over their heads. So has the freeholder of inheritance never. And many other fair preferments are laid upon a man that holdeth to him and his heirs, that never are bestowed upon men of inferior tenures and terms.

Sure. Are you a scholar?

Purch. No, truly.

Sure. Then Nature has taught you the art of ambition. And I fear you have set too fair a colour upon so mean a proportion, as is between your portion of money you have to bestow, and the exceeding contentments which you expect to grow by the land you purpose to purchase with the same.

Purch. Is every man that desires to purchase, ambitious?

Sure. Not as he is a purchaser. But the humour of his aspiring being discovered, discovereth his ambition to be the motive to the purchase. Will, and ableness to purchase, are in themselves so far from ambition, as it is a blessed benefit given of God to man; and a great cause of rejoicing is it, to the heart of the most religious man, when from a low estate and small portion, God doth give means to raise himself, by lawful purchase; but if all his aim therein, be a vain-glorious thirst, I cannot give it any other fitter title than ambition, which is a vice, and, methinks, I smell it in yourself, by all your former arguments of the happiness of a freeholder. It is a good thing, you say, (and so do I,)

to be a freeholder. But you must think he is not so free but he is subject to many services, whereunto some inferior tenures are not, as, when you are a freeholder, experience will teach you. Also it is (as you say) a good thing to dwell upon a man's own. Freeholders only dwell not on their own: he that hath a lease but for a year, dwells upon his own for a time. As for your heir certain and apparent; no doubt it is a comfort, so it be a comfort: for comforts prove in those casual and changeable inclinations sometimes crosses. Tender heirs are like young twigs: they will bend and be wreathed at the will of the parent; but, grown strong, they prove often strong distractions to best-minded and wealthiest parents, especially when they have learned to say, My father cannot put away his land from me. Then he begins to feel his father's health to be his sickness, his father's long life his lingering death. I need not tell you what succeeds; if you see it not, the mist of partial observation dazzles your eyes; yet would I have you to know this, that I hold it great happiness for a man of that estate to have a heir, but greater, and the greatest, to have a virtuous, a frugal, and thrifty heir. Touching the reputation which you pretend to gain by the title of a freeholder of inheritance, that is seen to be won and lost as is or shall be the reports of your good or ill conversation among your neighbours, which often poor men get and rich men lose. The clearing of the fear of having your living to be taken over your head, is some reason indeed; but many times the heir, to avoid the danger, sells it himself; sometimes before it come to his hand. For the preferments commonly laid, or expected to be laid, upon a man of that estate: howsoever ambitious men may think it glorious, men wise enough, of a temperate and moderate spirit, rather embrace their own freedom, and think it far more precious than the fairest imposed or assured preferments to office, commonly accompanied with care and contrivance.

Purch. I perceive you favour not estates of inheritance, the best and most absolutely reputed tenure that any man can be endowed with.

Sure. You much mistake me and the matter; for I ground not my objections upon any unworthiness of that most worthy tenure, but upon your ambitions, assuming reputation, security, office, and vain-glorious preferments, by reason of so small a mite of means as your stock (being but one thousand marks) is able to purchase.

Purch. I will purchase (as I take it) about forty pounds a year, with my thousand marks.

Sure. Thereabouts, at sixteen years' purchase; a weak revenue to support so weighty contentments as you have propounded to yourself.

Purch. I must cut my coat according to my cloth—spend no more than will arise of the farm.

Sure. But your thousand marks being gone, where is then the mean to stock your farm? for a farm without stock, is like a piece without powder, or a steeple without bells.

Purch. Truly, I confess it; but if I should reserve any of that portion for the stock, it would purchase far less: and therefore I conceive it better to strain myself some other way to stock it, though I give interest for a while, or let it out for some few years, to enable me to stock it myself afterwards.

Sure. So shall you soon indeed make trial of your adventure, either to arrive safe, with little advantage, or to suffer utter shipwreck, to lose both yourself and your ship. For the first, interest, the mother of misery, the longer she goes with her birth, the greater monster she breeds, that immediately devours him that begat it, worse than the viper that kills the mother. Of two evils, the least is, to let it. If, then, thou be accompanied with a charge, thou and thy charge must be maintained. If that eat

up thy income, or the better part of it, little will be laid up for the future stock; and so shalt thou rest *in statu quo prius*, as able in the end, as at the beginning of the term.

Purch. I know no other course to dispose of my money, in way of purchase; for lives are casual, and years run out so swiftly, as I cannot think of a better employment of my money, than to lay it out upon land of inheritance, for that is perpetual.

Sure. There are many of your mind who, by the greatness of their spirits, undermine their own estates, and so hurl voluntary repentance upon their own heads, which they cannot avoid.

Purch. If a man have a competent bargain, there needs no repentance.

Sure. A convenient bargain requires more than a competent *quid* for a competent *quo*, that is, a bargain barely worth a man's money. As he, that has a thousand pounds in his purse, and bestows it upon a jewel worth a thousand pounds; unless he purpose and can dispose this jewel for more than it cost, he may say he has a jewel worth a thousand pounds, and had a thousand pounds in money; but his money being gone, instead of using it to his gain, he looks on his jewel with grief, especially when commanding necessity requires needful supplies: then lies his jewel dead, and cannot, but had he his money, it would have supplied his wants.

Purch. This, in mine opinion, is little to the matter in question, for I lay not out my money so, but that I have a yearly profit, answerable to the value of my money, and lies not dead, as does his jewel.

Sure. Little odds between nothing coming in, and something coming in and profit nothing; as doth your farm, which either wanting stock, can yield little, or having stock of interest, eats the gain. But the question propounded was, whether a man of small means were better for his profit to purchase fee-simple, or to buy a lease?

Purch. That, indeed, is the question, and I think a more profitable course, to purchase land in fee-simple, than to buy a lease.

Sure. I say, more expedient cannot be, for a man that hath ten, or twenty, or more thousand pounds in his purse; for thereby he may confirm his hope of hereditary succession, and consequently of honour and office. But to speak in answer to your stock, at the most (as you say) a thousand marks, were it two or three thousand pounds, I affirm these kinds of purchases are not most profitable.

Purch. What then, in your opinion, is the best course to lay so small portions of money in, as you speak of?

Sure. Leases.

Purch. Alas, a lease is gone in the third part of a man's age, unless it be for fifty, sixty, or a hundred years; upon such, a man might be content to lay out his money.

Sure. I hold rather a lease of one-and-twenty years more beneficial.

Purch. That were strange; how can you prove that?

Sure. Admit you have one thousand pounds in your purse, and you will purchase a lease of one hundred years. It will cost you thirteen years' purchase, at the least. So your thousand pounds will buy eighty pounds per annum, which will not amount unto the interest of your money by twenty pounds a year. But if you buy a lease of twenty-one years, you may have it for seven years' purchase. So will your thousand pounds buy a lease worth one hundred and forty pounds a year, exceeding the interest of your money forty pounds a year. So there are three score pounds more by a lease of twenty-one years, than by a lease of one hundred years, which whether it be more profitable for a man to buy that hath no great means, judge you.

Purch. Truly, for my part, I do now conceive it so well, as I am utterly dissuaded from purchasing land in fee-simple, or for more years than one-and-twenty, unless I had a greater portion than indeed I have. And, methinks, I might compare myself (in the mind that I was) unto one that had fourpence in his pocket, who would needs buy a purse to put it in, and so bought

him a purse which cost him a groat; and he had as much money left to put in his new purse, as I should have had to have stocked my new farm, when I had bestowed my thousand marks upon forty pounds a year. But now buying a lease for one-and-twenty years, my thousand marks will bring me near three-score pounds a year, and yet reserve money sufficient to stock the farm. I do not think but if other men of my poor means did well conceive of this, they would be of the same mind that now I am.

Sure. I neither persuade nor dissuade any, to or from their own opinions, for, I know, it is as hard a matter to draw some men to a truth, as to remove some from an error. And some, I know, are always most persuaded to embrace that which is most in use, and refuse the better, that few affect, and not many have proved: and, therefore, to make a man's singular conceit (have it, in experience and practice, never so deserved an allowance) the precedent of other men's imitation, will suspend it until it become as common as vice itself; and, therefore, to yourself, I say, do not as I persuade, but persuade yourself; as your own conceit, in your seeming reason, shall tell you what is best or worst; though it be matter of fact, it is no matter of saving faith, therefore take right or left, as you list.

Purch. I am not so fickle in my fancy, as it should fly from one conceit to another, after such due satisfaction as you have given me: for, whatsoever other men's judgments may yield in this behalf, I take it the truest course for best profit by smallest means: and I think no arguments can be so forcible to remove what I have conceived. Only one scruple remains, which I may rather term a frivolous doubt, because it may succeed otherwise than I fear, and that arises, in my conceit, by reason of the shortness of the term of one-and-twenty years: for if a man leave his son a farm for that term, either it may be taken over his head, or else he must be forced to buy it again within fifteen or sixteen years, which both are things very unpleasant and distasteful to most men.

Sure. It is true; but the end of the term being truly known, it takes away some of the harshness, by a provident preparation against the time: for if a son to whom a man leaveth three-score pounds per annum (your own proportion) with a stock, if he, by his frugality, providence, and careful husbandry, cannot lay up in sixteen years so much as will either procure the same again, or some other as valuable elsewhere, leave him to live as he may after the term ended; for, it is not probable, that he would be thrifty or become more wealthy if he had thrice as much; for it is not the quantity of the thing left, but the quality of him to whom it is left, that proveth this proposition true or false.

Purch. It is so; for I have known some meanly left, with leases have grown rich, and some rich of inheritance, have become poor.

Sure. As are men's dispositions, good or ill, so, commonly, is the continuance of their estates prosperous or adverse.

Purch. Surely, it is true. It so appeareth by the carriage of young men in these days, who shew themselves most improvident and careless, for the most part, not only such as stand in possibility to be advanced by the ability of parents or friends, but such also (by a kind of impious imitation) as have no other means than either their own labours or sinister shifts; for as are the diseases of the body of late become yearly wonders for their strangeness, so men's profane humours and vicious qualities grow yearly more strange, by taking new courses of chargeable wickedness; changeable fashions in apparel, gaming, the pot, and their lascivious lives, rend patrimonies in pieces and bring men to mere beggary, that before scorned the mere title of gentlemen. A due observer may well note, that where one, left by a careful father wealthy, and, by the grace of God, is of discretion fit to manage what is left him, ten grow thereby the more insolent, secure, prodigal, vicious, and consume more in one year by their rank riot, than their careful fathers or regardful friends did get by their care and industry in ten; whereby groweth that strange vicissitude which we see in the world—

the father to purchase, the son to sell, the father to sell, the son to purchase, never continuing long in one line: many generations enjoy not one and the same inheritance. Patrimonies are like unto the feigned wheel of fortune, resembling also the waves of the sea, driven, now to the shore, and forthwith to the channel: as the tide and the winds, so are possessions posted from one to another, more in these latter days than ever before: minds, become inconstant, breed estates inconstant. In former ages an inheritance continued many generations, never altering either the line or the name of the owner; men had a kind of religious regard to preserve the inheritance of their ancestors, and in these days they think it a superstitious ceremony to keep it: the father buys in hope to better his son, and the son sells to dishonour himself; and, therefore, I think, whether it be fee-simple or lease, all is bait for a buyer, and a wasteful son is indifferent in both.

Surv. There is no cause so much to assure a son of future means by leases, as by fee-simples; for an eldest son is, in part, assured of his patrimony, howsoever he carry himself: but leases may be given as a chattel, and therefore may make a son the more awful. But it is a hard thing, that neither the love of parents in persuading, nor the law of magistrates by punishing, can prevent their daily increasing mischiefs: I think it may be affirmed that the fault is especially in parents, by giving and suffering, as also in magistrates, in not correcting such wilful transgressing the laws of love and obedience, and to shorten the line of that common liberty of young men whereby they live, do, and continue as they list; and so much the more, by how much they find their own strength, to rest in the ability and doting love of their abused parents, who (whilst they live), support these liberties by supplies of needless wants; and the hope of the whole after their parents' deaths, makes young men dive into the deepest of the danger of causeless debts, which (the parents dead) forces to be embowelled the best of his new-fallen patrimony, the relics whereof he must sacrifice to appease the violence of that devouring Hydra, and piece-meal offers the rest to his own vice and vain-glory.

Purch. Truly, these days affording such fruits, I wonder whether is more the cause, the folly of parents or the frenzy of children.

Surv. I think, indeed, many children (as it seemeth by their dissolute lives) are possessed with a kind of frenzy or madness; for they are as far from awe of government as are such as are mad indeed. And yet I think, of the two, the foolishness of doting parents is more the cause of their children's madness, than is the mere natural inclination of the children; for, did parents keep a kind of power in their own hands, and did not feed their children's humours too full, they could not but withdraw, though not their desires, yet their means from those wasteful courses.

Purch. It seemeth to me a matter almost impossible. My reason is, because it is now grown to so general a disease: if it were in the city only, and not in the country, or were it in one shire and not in another, or in one town or parish and not in another,—nay, were it in one house and not in another, I would then think the country might reclaim the city,—one shire, one town, or one house might reform another; but being as it is, so universal in cities, country towns, and houses, if any place or person be now free, it, or he, is in danger to be seduced; and, therefore, one father may endeavour by counsel, force, or fair words to order his son in the way of hope to be happy, but what ten fathers by counsel can work in two children in much time, one impious, idle, vain, and vicious neighbour's son shall poison twenty in less. And, therefore, unless, as the infection is general,

there could be found a general preservative, it will grow, *ab hoc malo, ad illud pejus*, to be daily worse and worse.

Surv. So then let us leave them, and I leave you,—fare you well.

Purch. Nay, I must needs intreat your opinion in one thing more; I will not be tedious. When a man doth purchase land in fee-simple, or lease, are there not some special points of observation to be considered before a man either buy or sell?

Surv. I think none is so ignorant or simple, but if he buy a horse, he will see what pace he hath, whether he be sound, and whether he that sells him have right to the horse, and other circumstances fit to be considered in the buying of a horse. And will any man be so mad as to buy or sell land without due consideration, what he buys or sells? And yet, I must confess, that some do purchase, and some do sell, as they that cut wood over their heads, the chips fall into their eyes, they see not what they buy, or what they sell. Many have been and are daily deceived, for want of the true judgment of the things they buy or sell, not seeking to inform themselves by themselves; nor, for fear of charge, be informed by some of understanding, to view the thing they buy or sell, a matter savouring either of little providence, or great security.

Purch. Wherein I pray you should a man seek especially to be informed in buying or selling land?

Surv. Methinks it is a needless question, because these things are common to every man's conceit. But, to satisfy your desire, I take it, the title is first to be duly considered, and then the drawing of the evidence, for in these days there go more words to a bargain of ten pound land a year, than in former times were used in the grant of an earldom; and yet, methinks, many superfluous words might be omitted, and the assurance good, as they were in former times, with far fewer words, but that I leave to the learned, that know what is fit to be inserted or omitted, according to the quality of the thing purchased, only the true meaning should be the best assurance. Secondly, the yearly and likely permanent value is to be considered. The quantity, quality, and nature of the soil. The means to better it,—as by cleansing and clearing the grounds of bushes, and other inconveniences, draining of the low, boggy, and watery grounds; where, and how to get marl, chalk, moor-earth, sea-sand, and such like means, to improve and better mean grounds. The scarcity or plenty of wood and timber, which are either a help or hindrance to the sale. To observe the fences, and the means to continue them. The water, whether in springs, river, or standing pools, which last is most inconvenient. The housing, how convenient and competent they are, and how they stand presently repaired, and the supposed charge to do it. The situation of the place, for air, sweet or contagious. The ways, good or cumbersome, commons of pasture, commons of estover, if any be; what commodities it especially yields; how and where they may be best vented; and where, and how far off household necessities are to be had. Duties to the church and commonwealth, with services due to the same; what issues out in rent, or other charges; what is paid to it; and many other things may be considered in the view of a manor, which at large are set down in the second and third books.

Purch. These are necessary notes of remembrance, which are fit to be considered, both by him that sells, and him that buys any land, the neglect whereof may prejudice either; and thereby no doubt many are deceived, and some abused. I am loth to trouble you further; I thank you for your patience; I will leave you to your occasions.







